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Table of Contents, Page 3

Index of Advertisements, Page 58

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Volume XLVI

NEW YORK, FEBRUARY 22, 1919

No. 8

CONTENTS OF THIS ISSUE

The Paving Outlook for 1919 143

A symposium by city and paving engineers from all sections of the country, each telling for his section the effect of the war on paving work and prices and the outlook for the coming season.

Statistics from Cities 148

Summary of figures and data from several hundred cities telling the amount of each kind of pavement that the officials think should be built, and the amount that probably will be built this season.

The Manufacturers' and the Contractors' Point of View 149

Their opinions as to the permanence of high prices and the prospect of paving work stated by the assistant secretary of the National Paving Brick M'frs. Ass'n., Maurice B. Greenough.

Improving Hillside Streets (Illustrated) 150

How two-level streets, depressed roadways, and switchbacks are used in San Francisco to overcome difficulties presented by steep hillsides.

Assessments for Street Improvements 151

A list of the various classes of improvements and services for which different cities assess the cost, the cities that make assessments for each, and the percentages of cost assessed.

Effects of Heavy Traffic 154

Reports from several hundred cities concerning the weight of trucks using their streets, the effect upon the pavements, and precautions taken or recommended to prevent destructive effects.

Editorials 161

To Pave or Not to Pave—Assessing Paving Costs.

Wood Block Pavements at Lakewood (Illustrated) 162

The method employed in laying block on pitch cushion, with pitch filler one-third the height of the block, is described by the city engineer of Lakewood, Ohio, E. A. Fisher.

The Week's News:

Roads and Pavements..... 164

Pennsylvania to Begin Work, Harrisburg, Pa.—Work of Federal Aid, Washington, D. C.—Municipal Paving Plant Saves Money, Portland, Ore.—Legislature Approves Experimental Highway, Salem, Ore.

Water Supply 165

New Water Works Addition Approaching Completion, Wilmington, N. C.—Water Bill Increase to Be Repealed, Charleston, W. Va.

Street Lighting and Power..... 165

State Survey of Heat Value of Gas, Indianapolis, Ind.—Would Mortgage One Utility to Purchase Another, Madison, Wis.—Survey of State-Owned Power Equipment, Richmond, Va.

Fire and Police..... 166

Fireman Killed in Blaze on Transport, New York, N. Y.—“Public” Blamed for Molasses

Tank Explosion, Boston, Mass.—Savannah Terminals Swept by Fire, Savannah, Ga.

Government and Finance..... 168

City to Appeal in Case of Records, San Francisco, Cal.—Woman Wants to Be Chicago Mayor—Seattle Mayor Suppresses a “Revolution.”

Traffic and Transportation..... 168

Subway Engineers Reinstated, New York, N. Y.—Service-at-Cost Plan for Minneapolis.

Legal News—Notes of Recent Decisions..... 169

News of the Societies..... 170

Problems Cities Are Studying with Experts..... 170

Industrial News 171

Contract News 25



The TEXACO Service Map



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Municipal Journal

Volume XLVI

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THE PAVING OUTLOOK FOR 1919

Reports by Paving Officials in All Sections of the Country, Giving Their Opinions on the Subject as Formed During the Past Two Weeks—Effect of War on 1918 Paving and Present Prices.

Perhaps the greatest interest of engineers and other municipal officials connected with the paving departments of the various cities of the country is centered at this time more in the outlook for paving work in 1919 and the prices that will obtain for materials and labor throughout the country, than in any technical questions, such as types of pavements or methods of construction. In a number of cases an important factor in determining the amount of paving that will be done will be the raising of funds to pay for the same. The question of finances is considered in another article of this issue.

In order to obtain as reliable information as possible concerning the prospects for paving work in the various parts of the country, Municipal Journal has asked a number of engineers in the various sections to submit such facts and figures as they could furnish and such opinions as to future prospects as they were willing to give. From a few sections it was found difficult to obtain the desired information, but that which we present herewith will give a very good idea of the conditions over the entire country as they appear to paving officials who keep themselves informed concerning these matters.

In asking for this information we requested the writers to describe the general condition as to paving during the year 1918, the prospects for work for the year 1919, and the prices for sand, gravel and other local materials and for labor that would probably obtain in their section of the country; suggesting that the judgments as to future work and prices might be expressed as relative to normal conditions immediately before the war.

Data furnished by the different writers as indicating conditions in their sections, and one or two additional sectional reports which are on the way but will not be received in time for this issue, will be published next week. The subject is discussed editorially on page 161.

STATE OF WASHINGTON.

Concerning the State of Washington and the adjoining states of Oregon and Idaho, Alfred D. Butler, city engineer of Spokane, writes:

"In the late summer and early fall of 1918 the War Department interposed a number of restrictions on making public improvements, restricting the amount of bond issue and only permitting certain very necessary improvements to be made.

"This had a very depressing influence on the disposition of the public to make improvements, as it looked, during the fall of 1918, as though it would be impossible to make any improvements at all during this year. The mind of the public, so far as I am able to interpret it, has not readjusted itself to the conditions as they now exist. The transition was so sudden, from the desire on the part of the government to have no work inaugurated, to the

present desire to have all work possible inaugurated, that the public has not yet been able to adjust itself.

"Spokane is the center of a large agricultural and mining district. The farming districts have been especially prosperous during the past few years and I believe for the year 1919 there will be from twenty-five to seventy-five per cent more improvement work done than in the year 1918. This will consist in street improvement work and sewerage work in the small country towns, and the paving of highways in the farming region.

"In questioning the state highway engineer, I find that in his department there will be nearly 100 per cent more work done this year than was done last year in that department.

"I feel that the improvement work that will be done in the larger cities will not be more and may be less than that done in 1918. The indications are, however, that a number of improvements may be inaugurated in the latter part of this year, but not in time for the work to be done during 1919."

UTAH, WYOMING AND COLORADO.

The following report on these states has been furnished by Sylvester Q. Cannon, city engineer of Salt Lake City:

"In the states of Utah, Colorado and Wyoming the improvement of state roads by hard surface paving has only been begun in the last few years, and it has only recently come to be generally recognized that these hard surface pavements on main roads are very important to the communities they serve.

"There has been, therefore, a general increase from year to year in the extent of these pavements laid, notwithstanding the war conditions. Information obtained from the State Highway Departments of these states show that approximately 20 miles of such pavements, approximately 18 feet in width, at a cost of about \$19,000 per mile, were laid during the last year. This is generally equal to, or in excess of, work done in previous years.

"In Wyoming no pavement was laid prior to 1918. A comparison of unit costs for this work for 1916 and 1918 shows an increase of about 30 per cent for last year. In the matter of materials the increase of cost varied from about 15 per cent in Utah to 40 per cent in Colorado, and the labor cost from 50 per cent in the former to 40 per cent in the latter.

"As to proposed work for 1919 the prospects are for a large increase of pavements, amounting to about 133 miles in all, at an estimated cost of \$2,700,000. The increase in Colorado is estimated at three times the amount done in 1918, Wyoming about eight times and Utah about eleven times. If the plans of the State Highway Department of this state are carried through there will be practically ninety-eight miles of pavement laid. The

cost of materials and labor will probably average about the same during this year as last.

"In the cities of these various states there is considerable variance with reference to the amount of work done and the amount proposed to be done. In Wyoming none of the cities propose permanent pavements. In Colorado, with the exception of Denver and Pueblo, practically no work is proposed for this year and none was carried through last year. In Utah the four largest cities—Salt Lake, Ogden, Logan and Provo—laid, all told, 82,000 square yards of pavement, varying from about 18 feet in width to about 40 feet in width. This exceeds the amount laid in normal years in all of the cities except Salt Lake by about 40 per cent. In this city the pavements laid last year were very much less than in normal years. In fact no new contracts were let last year for paving. The only work done was that carried over from the previous year.

"In the matter of cost it appears that in Salt Lake and Ogden the cost of work done was about as low as in normal years. In the other cities of Utah and Colorado it was about 30 to 40 per cent greater. Materials showed an increase in 1918 of about 25 per cent over normal years and labor about 50 per cent increase.

"The estimated cost of work for 1919 will probably average about the same as, or slightly lower than, 1918. This will be due doubtless to the large number of men returning from army service and to the reduction in the number of employes by various industries due to stoppage of war production. The cities of Colorado indicate, with one or two exceptions, that very little work will be done.

"The cities of this state contemplate a large increase in the amount of pavement to be laid, contingent upon the approval of bond issues by the voters. Salt Lake City is at the present time preparing for a bond election in the sum of two million dollars for various improvements, including about 15½ miles of pavements. The issuance of this amount of bonds will mean the expenditure of approximately 1½ million dollars more, which will be paid by local assessment of property benefited. Salt Lake County is also preparing for a bond election in the sum of 1½ million dollars, which will be used chiefly for hard surface pavements, including, however, some scenic highways to be constructed in the Wasatch mountains. Ogden is preparing for a bond election of several hundred thousand dollars, of which approximately \$260,000 will be spent for pavements. The State of Utah also contemplates the issuance of bonds to cover a portion of the cost of the proposed road paving mentioned in the beginning of this article.

"Labor conditions at the present time indicate that unless municipal and state improvements are undertaken promptly and in large measure there will be a great many unemployed. Private corporations are apparently holding back with improvements because of the high prices prevailing.

"The general sentiment throughout the cities and the state appears to be favorable to the issuance of bonds for these necessary improvements."

NEBRASKA, IOWA AND KANSAS.

For the report in and around Nebraska, including Iowa and Kansas, we have obtained the following statement from John A. Bruce, city engineer of Omaha:

"The year 1915 was, in my judgment, what might be considered a normal year for the states under consideration so far as yardage of pavement construction is concerned. During the years 1916 and 1917, a gradual decline was very noticeable. During 1918, taking into con-

sideration only work that was contracted for and completed within the year, the amount will undoubtedly run considerably less than ten per cent of the volume of 1915. In the three states, Iowa's percentage was, from information available, the lowest, followed by Kansas second, and Nebraska the highest. The fact that Nebraska's percentage was higher than that of either of the other two states is due to the unusual volume of work done in Omaha as compared with other cities, this volume being about 70 per cent of the total street paving of 1915. There was practically no paving done in the smaller towns of Nebraska during the year, while the work done in Iowa and Kansas was more uniformly scattered over the states as a whole. In all three states several contracts let in 1917 were completed in 1918; but even with these added to the contracts let and completed during the year, the total would not go beyond ten per cent of 1915 in the states of Kansas and Iowa, and would probably run up to 15 per cent in Nebraska.

"The reasons for the curtailment of the paving program in the three states in question were: first, the increase in unit prices due, of course, to the increased cost of material and labor and the difficulties of obtaining either at almost any price; and second, the prevailing desire on the part of all communities to assist the government in its war program, by releasing labor for use in connection with strictly war activities and saving the money that would otherwise be invested in public improvements, for investment in bonds and other government securities.

"In Iowa, a uniformly increasing yardage of pavements in municipalities was constructed, including 1915, and with the organization of the present Iowa State Highway Commission in 1913, a great impetus has been given the improvement of highways in rural communities. A state highway program is now under consideration involving the expenditure of \$100,000,000, largely hard-surface construction, covering a seven-year period. This does not include proposed pavements in municipalities which, from reliable news, will probably double the yardage laid in 1915 if present plans mature. However, my personal opinion is that 50 per cent of the work proposed in municipalities in Iowa will go by default as soon as bids are opened, due to high prices, but as I am convinced that only slight reductions in prices can be expected in the next few years, and that the public at large will shortly realize this, I am of the opinion that paving programs will be formulated and carried out on an increasing scale with a possible duplication of 1915 yardage during the present year.

"Kansas, having more industrial activities, has a larger number of towns of a population of 1,000 or more than Nebraska has, and being an older state, took up the question of hard-surface treatment of its streets at an earlier date. As a consequence, the yardage of pavement laid in 1915 was considerably more in Kansas than in Nebraska. During the present year, Kansas is competing in its highway and paving program with Iowa, but with a less likelihood of carrying out its program to completion in the same length of time. This is due partly to the fact that Iowa is a richer state than Kansas and also to the fact that material costs in Kansas for hard-surface pavement are, in general, higher and transportation facilities not so good.

"In Nebraska, outside of the cities of Omaha and Lincoln, practically no paving was done prior to the year 1900. Very little work was done from that year until 1910, so that practically all the paving done outside of the two cities of Lincoln and Omaha has been done in the last eight years. From reports of activities in the

various towns in the state, even making allowance for the fact that probably 50 per cent of the work now contemplated will 'fall by the way side,' I would estimate that there will be twice as much paving done in Nebraska this year as there was in 1915.

"As to the Nebraska highway program for the present year, I would estimate that a comparatively small yardage of hard-surface roads will be constructed, due to the fact that the necessary preliminary grading has to be done first, together with the construction of permanent and adequate water ways.

"Douglas county, in which Omaha is situated, contemplates a program which will involve the expenditure of three million dollars, which will possibly stretch over a period of three years. I do not anticipate any appreciable amount of this work will be started during the present construction season owing to the necessity of securing special legislation for this purpose and the issuing and selling of the bonds.

"In my judgment, the outlook in the three states under consideration is very favorable with reference to a resumption of paving activities on a larger than pre-war scale; and I am not unduly optimistic in making the statement that the Middle Western States, on account of improvement activities of this nature in the next five years, will force admiration and amazement into the hearts of the sister states bounded by the Atlantic Ocean and the Mason and Dixon Line, who are still not absolutely certain but that the Indians are roaming wild over the water sheds drained by the Missouri river and its tributaries."

TEXAS, OKLAHOMA, ARIZONA AND NEW MEXICO.

The city engineer of Fort Worth, Texas, F. J. Von Zuben, sends data from twenty-four cities in the above states, which are summarized below. Mr. Von Zuben says: "The war, while it temporarily held up improvements here, was the occasion of bringing many men to Texas and Oklahoma from other parts of the country, and the prospects for the early development of this portion of the country are promising, as a consequence. Many cities have not as yet completed their plans, however."

Dealers in paving materials who were consulted by Mr. Von Zuben informed him that in Arizona and New Mexico there were prospects of work in only two cities in each state, and of these the only one that reported any decision as yet was Albuquerque.

The cities reporting that they had decided upon paving for this year were: in Texas, Fort Worth, Beaumont, Bryan, Cleburne, Corpus Christi, El Paso, Houston, Mineral Wells, Port Arthur, San Angelo, Texarkana and Wichita Falls. In Oklahoma, Ada, Ardmore, Anadarko, Bartlesville, Eufala, Dewey, Ft. Sill, Lawton, Pauls Valley, Ponca City and Sapulpa.

Summarizing the reports, the Texas cities did 584,700 sq. yds. in 1917; 294,492 sq. yds. in 1918, and are planning 502,000 sq. yds. for 1919. (Four have not yet made their plans.)

The Oklahoma cities did 212,638 sq. yds. in 1918 and have planned 311,285 sq. yds. for 1919, the latter being reported by nine cities, the other two not having made plans yet.

In Arizona, Phoenix paved 34,918 sq. yds. in 1917; 65,722 in 1918, but has not decided upon this year's plan.

In New Mexico, Albuquerque plans 120,000 sq. yds. of paving this year.

In the matter of cost of materials, in Fort Worth crushed stone sold for \$2.50 and \$3.00 respectively in 1917 and 1918 and is now selling at from \$2.50 to \$3.00 per cubic yard. The prices for gravel for 1917, 1918 and 1919

are \$1.50 per cu. yd., \$1.90, and \$2.00. Sand, \$1.50 per cu. yd., \$2.00 and \$2.25. Labor, per hour, 25 cts., 30 cts., and 35 to 37½ cts. Other Texas cities report 1919 prices for materials as 15 to 100 per cent higher than in 1917, and labor 25 to 100 per cent increase, averaging about 70 per cent. In Oklahoma, Ardmore reports prices of materials advanced about 20 per cent and labor 35 per cent from 1917 prices, while Bartlesville reports the increase as 75 per cent and 100 per cent respectively.

INDIANA AND ILLINOIS.

From an Illinois engineer of long and wide experience in paving matters, who asked that his name be not used, we have received a report concerning municipal and state highway conditions in Illinois and the adjacent sections. He reports that nearly all of the cities in Illinois are in a condition of uncertainty, as is also the state highway department. Prices are so high and labor has been so scarce that it seems to most city officials to be the better part of valor to wait until matters have settled somewhat. Springfield is one of several cities, however, which is considering a large amount of work. Last year that city prepared an ambitious program for paving down-town streets and prepared the plans for it, but later the embargoes prevented starting the work. The plans are completed for several miles of repaving in this city, a large part of which will probably be wood block.

Sangamon county voted some time ago a bond issue of \$2,000,000 for good roads, which has not been spent and which it hopes to spend this year, the county receiving, under a provision of the state law, a refund from the state at such future time as may find the money available in the state treasury. Lincoln, Decatur, Chicago, Cook county, and Vermillion county have uncompleted contracts let two years ago which they hope to renew work on this spring. Most cities and counties appear ready to help in the state work, to build city streets to meet the state roads at the city limits, but do not seem to be considering much else in the paving line.

As to state highway work, high prices and the question of the ability of the state to sell the bonds voted in November at the required prices are offset by the necessities of finding employment for war workers and returning soldiers. Also there is a question whether there will be contractors enough to do the work which is in prospect. The state and counties have on hand an unexpended balance of about \$2,000,000 for construction of roads under the state aid plan by which half of the cost is paid by the state and half by the counties. Five definitely located federal aid roads are to be built with funds from the state, the national treasury and the counties, of which nearly \$10,000,000 is now on hand or will be by the time the money can be spent. About \$4,500,000 of this will be available by July of this year from the state and federal governments, and half of this amount in addition from the counties through which the roads pass. There is therefore something like \$12,000,000 on hand or available before July, 1920, which can be spent before the state bond issue is actually realized on. A friendly suit is now in the courts to test the validity of the bond issue law and vote, and until this is decided there will evidently be no attempt to sell any part of the \$60,000,000 of bonds.

In general there is no lack of money and the only question is as to the advisability of letting contracts at present prices. The question of whether to pay present prices or to wait for a break in prices, and that of whether to start work so as to give employment to those who are beginning to need it, or to hold back on lettings until wages come down, must evidently be decided by public opinion, which has not yet had sufficiently strong and

definite expression to warrant a decision. Most students of the past believe that it will be nearer ten years than one year before prices and wages return to approximately their former level.

Bids were received last fall on a number of sections of the Dixie and Lincoln highways, both federal aid roads, but they were so high that all bids were rejected. The state built some of the roads covered by these bids last fall at a cost less than either bids or estimates. These sections are now ready for letting at an early date and a call for bids is expected soon.

Indiana has obtained a favorable decision as to the validity of its state highway commission law, which will enable it to spend some money on federal aid roads and some of the main lines of its state system.

Inquiry at the January 30th meeting of the Illinois Engineering Society developed that engineers, contractors and material men generally believed that no considerable amount of work would be undertaken before a drop in the price of materials, although not much complaint was made regarding wages, the hope being expressed that more competent labor can now be obtained and thus much better results for the same prices than were possible last year. The most serious deterrent was considered to be the increase of a third in freight rates on construction materials and especially the adoption without modification of the ton-mile freight schedule.

MICHIGAN AND WISCONSIN.

Conditions in Michigan and Wisconsin are reported upon by A. Lenderink, city engineer of Kalamazoo, whose report is as follows:

"A survey of the amount of paving and other municipal construction in the cities and towns of Michigan and Wisconsin during the past year shows a drop below normal between 25 and 95 per cent for the year 1918. In the smaller cities and towns paving was practically suspended because of the increased cost of labor and materials, and the inability to obtain help even where contracts were awarded in the fall of 1917.

"There was a feeling in most cities and towns that all municipal work that could be postponed should go over during the period of the war. In a number of cities, contractors who started work in 1917 were unable to finish their work that season, because they could not compete with wages paid at government cantonments and factories in cities doing war work. The completion of these contracts or work in 1918 was all that was done.

"For the larger cities in the two states, the average amount of paving was about 35 per cent of normal. Milwaukee did about 75 per cent, and Saginaw only about 5 per cent. The increase in cost of labor ran from 30 to 60 per cent, and the increase in cost of materials from 25 to 85 per cent. The average increase for both is about 50 per cent.

"For the coming season there is a spirit of uncertainty in the smaller places because of the present high cost of materials. The officials are waiting to see if prices will not decline. In the larger places, especially where the factories held war contracts, there is an abundance of labor. In an effort to keep these men employed, and because of the amount of work that has been postponed for the past two years, the cities are planning a full paving program. The officials in the cities feel that the best interests of the community can be served by going ahead even at increased costs. Municipal construction offers an outlet for the excess labor during the period of re-construction. Flint probably has the largest paving program outlined of any city in Michigan outside of Detroit.

"The question of sale of improvement bonds at this time may make some cities cancel part of their program.

"The Michigan Good Roads Association is arranging an extensive program for good roads in the state, and for a memorial paved highway across the lower part of the state from Saginaw and Port Huron through Lansing, Battle Creek and Kalamazoo to Lake Michigan and Chicago."

MISSOURI AND ILLINOIS.

The report on Missouri and Illinois was furnished by C. M. Talbert, director of the Department of Streets and Sewers of St. Louis. In addition to his general statement, Mr. Talbert sends reports from the city engineers of Joplin, Kansas City, St. Joseph, Sedalia and Springfield, Mo., and Joliet, Ill. Mr. Talbert also got in touch with contractors who are interested in road work throughout the State of Missouri.

In St. Louis conditions are such that the officials believe that they should place on the market at the earliest possible moment a sufficient amount of work to justify contractors in organizing their forces for a full season's work, and material men in opening up their plants on the same basis. Bids are to be opened in March for about \$525,000 worth of street construction and reconstruction, \$26,000 of alley construction, and \$6,000 worth of sidewalk construction, or a total of \$560,000. Missouri has outlined a policy, which has the approval of the governor, for a bond issue greater than that voted by Illinois—\$60,000,000—but it is certain that this amount, under the most favorable circumstances, will not become available until next year, and it is doubtful if the Illinois money can be spent during this working season. Without receiving a direct report from Illinois, it is his impression that there will be a revival of street and road work in both these states, the amount depending largely upon the prices of material and labor. It is also his impression that the prices of materials must depend entirely upon the amount of work let.

"There seems to be a general tendency on the part of those in responsible charge of work to feel that it is a duty on their part to start, as soon as possible, all character of paving and road work, to the end that as much labor as possible may be utilized.

"If I may state in a word my general conclusion, it would be that the entire tendency is toward a considerable revival of this character of work throughout the two states this year and a still greater amount next year."

From the reports obtained by Mr. Talbert from city engineers the following statements as to work proposed for 1919 are obtained: Joplin, Mo., will pave several streets with concrete, expecting to pay about 23 per cent more than in 1918 and about 30 per cent higher than in 1917.

Kansas City expects to spend about \$8,000,000, including sewers and bridges as well as paving. The paving work will not be confined to any particular kind of material. The amount of work is expected to be about five times as great as last year. No estimate is made as to prices.

St. Joseph has mapped out a program, but no definite action has yet been taken. Last year about 0.3 of a mile of pavement was constructed, but this year there will probably be 10 miles in addition to oiling 6 or 8 miles of macadam. It is anticipated that the prices will be at least 100 per cent greater than in 1917.

Sedalia received bids on the 17th for 23,000 square yards of brick pavement, which was about ten times as much as was laid in 1918 and 40 per cent more than in 1917. Prices this year are 30 to 40 per cent above those for 1917.

Springfield has prepared a sewerage program, but none yet on paving. What paving is done will probably be with brick for heavy traffic and Topeka macadam for residence streets. The amount of street work this year will probably be 25 per cent greater than last year and the prices 75 per cent higher than in 1917.

Joliet, Illinois, intends to spend about \$250,000 in street paving, about half brick and half asphaltic concrete. Prices for the former are 25 per cent higher than in 1917 and those for the latter 10 per cent higher.

ALABAMA.

The city engineer of Birmingham, Ala., Julian Kendrick, did not wish to make any general statement for the states of Georgia, Alabama and Mississippi, but the considerable area known as the "Birmingham district" is such an important part of this section of the country that his report for that district may perhaps be considered as typical of conditions throughout the states named. He reports that in his opinion not more than ten per cent of the average annual amount of improvements was made during 1918 which originated during that year, although quite a little work was done that originated during 1917 and some of it even as far back as 1916, the starting or completion of which had been more or less delayed owing to inability to secure prompt delivery of materials.

"Of course the foregoing does not apply to cities or towns, or even counties, in or near which cantonments or war enterprises were located, which created the necessity in many instances for the construction of either pavements, sewers or water works extensions, the financing of which, and the delivery of material, received Government aid or encouragement.

"In the case of Birmingham the only work undertaken during 1918, the ordinances for which were adopted that year, consisted of a few lateral sanitary sewers as a health measure and a few blocks of macadamized streets, which had been agitated for some time previous. However, there was a considerable amount of street paving completed during 1918 which had been begun and should have been completed in 1917 but for unavoidable delays incident to the war.

"This city has contracts outstanding for over two miles of street paving which was let in 1916, the starting of work on which was delayed by the inability of the Street Railway Company to secure prompt delivery of rails and special work. When this material was finally delivered the Street Railway Company began its track work, but later was forced to abandon it, since the Government would not approve the securities which it was necessary to issue in order to carry on the work. In the meanwhile the price of labor has increased from \$1.40 to \$3.30 per day and the price of cement from \$1.60 to \$2.60 per barrel, and other material to a greater or less extent. It is obvious that it would be unjust to require the contractor to complete the work at its original price; at the same time property owners who would be assessed for the cost of this construction claim that the city should have arranged to have the contract executed promptly and that they are unwilling to pay the additional cost. The matter has been under discussion for some time, without any definite conclusion being reached.

"As regards future work, under normal conditions there would be more to do than it would be possible to complete during the year of 1919. However, owing to the unsettled conditions in the price of labor and material, little or no work is being let to contract, and practically no petitions are being filed by property owners for public improvements.

"I believe that if it were definitely known that the price of labor and material would remain fixed during the next twelve months much work would be proceeded with; but owing to the uncertainty of future prices, property owners who will have to pay the cost of the work are hesitating, fearing that they will have to pay more than their neighbors who delay filing their petitions."

WESTERN PENNSYLVANIA.

Conditions in Western Pennsylvania and vicinity are described by Nathan Schein, division engineer, Department of Public Works, Pittsburgh, Pa., as follows:

"Among the many problems confronting the nation at this time, the immediate provision of employment for returning soldiers and workmen dismissed from war industries appears to be one of the most important. Perhaps the largest source of such prospective employment is to be found in the construction of public works, as roads, bridges, buildings, etc.

"Since the advent of the United States into the great World War, there followed a train of events which produced a very marked decline in public work and building construction in this section, as throughout the country, but now a very bright future prospect for such work is in store. Although since 1914 the price of labor and materials have steadily advanced, yet in the latter half of 1916 the material and labor operations were the heaviest in the history of the country. The demand for highway improvements continued to increase until in 1917 the paving program of the city of Pittsburgh was far above that of the average year, although a marked decline in building construction was experienced throughout the country.

"In the year 1917 a shortage of labor was experienced in municipal and highway work. Materials became scarce and naturally very costly, and all conditions were much adverse to any great activity in public work or highway work. In the latter part of 1917 there began regulations which affected materially all public works, and from that time until the signing of the armistice paving work by municipalities and states was on a great decline. In the month of July, 1918, the War Industries Board still further curtailed street improvements by issuing an order to the effect that priority assistance would be withheld on all new construction work not essential to and not contributing either directly or indirectly toward winning the war. Later in September an approved permit had to be obtained from the United States Highway Council before any highway work could be started. This procedure consumed much time, and as a result very little paving work was done during the year. The city of Pittsburgh finished about fifty per cent of its contemplated highway work during 1918.

"By the signing of the armistice the government restrictions on public improvements were immediately removed, and it now appears that highway and other construction work will be resumed with renewed vigor. There are great demands for such work, especially since the advent of the motor-driven vehicles. Petitions for improving roads and streets are growing rapidly in number. There is already a surplus of labor and material which are so advantageous for just such work. The people of the State of Pennsylvania have already voted a bond issue of \$50,000,000 to be expended on highway work in the next few years. The city of Pittsburgh is contemplating a people's bond issue of perhaps \$12,000,000 for public improvements, of which sum more than \$8,000,000 is to be expended on street improvements. This, in addition to the ordinary contemplated yearly expenditure for highway improvements of the various cities, towns, boroughs and surrounding territory,

promises the greatest activity in street and highway construction work for several years that the people of Western Pennsylvania ever witnessed."

In general comment he states that it "appears now" (on February 8th) "that prices will come down to some extent, but will of course be higher than prices before the war. There is a strong feeling everywhere that large paving work will be undertaken in this district, and the city of Pittsburgh is in good shape financially to undertake this work." From N. S. Sprague, chief engineer of the department, we learn that the city expects to submit to the people for a referendum vote a bond issue for various public improvements aggregating \$12,000,000, of which \$6,830,000 is for street improvements, \$550,000 for highway bridges, \$500,000 for resurfacing roadways and other improvements in the park system and \$1,000,000 for street repaving.

NEW YORK, NEW JERSEY AND PENNSYLVANIA.

A very complete report on these states would have been presented, prepared by William A. Howell, engineer in charge of streets of Newark, N. J., had not Mr. Howell a few days ago been incapacitated from completing his report by an attack of influenza. A large amount of data has been collected by him and will probably be published in detail in a week or two. We hope also that Mr. Howell will within that time be able to prepare his formal report. In the meantime we submit statements made by him in a letter accompanying the statistics which he sent, together with a few figures and summaries:

"Many replies that were received absolutely ignored the forecast for 1919. I have, however, received a goodly number of forecasts, and the tone of optimism is so strong and insistent that I constrained to conclude that in this district 1919 is going to be a good year—probably 50 per cent better than 1915 or 1916, for instance. There are local conditions in a number of cities (my own, for instance), such as an abnormally large tax rate that will alarm the tax-payers to such an extent as to materially affect local improvements. However, improvements are needed almost everywhere, labor promises to be plentiful, materials (except in a few instances) will not be higher than during 1918, and the only thing lacking to start things moving is a little confidence. Taken as a whole, there is a general feeling that necessary work has been restricted during the past two or three years and immediate measures must be taken by progressive municipalities to regain the ground lost by inactivity of road work during the war."

In commenting upon the figures of paving done in 1918 as compared with previous years, Mr. Howell wisely suggests that if a careful analysis be not made of the figures a misapprehension or misunderstanding of the true paving conditions is probable. For instance, Newark did considerable work in 1918, but 95 per cent of it had been contracted for in 1916 and 1917, and similar conditions existed in many and possibly most other cities. He suggests going back at least to 1914 in selecting a year of normal paving. As an illustration, Passaic, N. J., reported the amounts spent for paving during years 1913 to 1918 inclusive to have been as follows: \$101,770, \$127,760, \$93,966, \$50,091, \$84,319, \$63,036. It is considered probable that the expenditure for 1919 will be \$100,000. In Brooklyn, N. Y., sheet asphalt (which constitutes by far the largest amount of paving) was laid as follows, the figures being square yards for the years 1913 to 1918 inclusive: 991,464, 702,135, 393,827, 418,569, 476,745, 94,650. The average for the six years was 512,898. (No forecast for 1919.)

In the matter of prices, in Newark the cost of sand

per cubic yard during the last six years was \$1.25 up to 1918, when it jumped to \$2.15; stone was \$1.85 for the first five years and \$2.85 in 1918. Cement prices were \$1.85, \$1.70, \$1.65, \$2.05, \$2.60 and \$3.35. Mr. Howell believes that the prices in 1919 will be practically the same as last year. In Reading, Pa., sand cost \$1.05 in 1915, \$1.44 in 1917 and \$2.25 in 1918. Broken limestone was a minimum of \$1.07 and maximum of \$1.83 in 1918. Asphalt per ton f. o. b. Reading advanced from \$22.45 in 1917 to \$35 in 1918. Paving brick (buff) per thousand f. o. b. Reading cost \$25.65 in 1913 and 1914, \$26.50 in 1916 and \$34.50 in 1918. Labor on highway maintenance cost 25 cents per hour during the first four years, 27½ cents in 1917 and 30 cents in 1918, while pavers' wages advanced from 31¼ cents to 35 cents in 1917 and 40 cents in 1918. In Brooklyn the cost of laying sheet asphalt on a 16-inch concrete foundation during the six years in question was as follows: \$1.984, \$1.790, \$1.414, \$2.075, \$2.346 and \$2.343. Granite was \$3.996 in 1913 and again in 1916, \$4.194 in 1917 and \$4.210 in 1918.

Among the reports of paving proposed for 1919 in the cities of this section are the following: Montclair, N. J., 60,000 sq. yds. penetration resurfacing; 30,000 sq. yds. reshaping and surface treatment, and 70,000 sq. yds. of patching and surface treatment with tarvia or asphalt oil. Jersey City, N. J., granite blocks, new base, 62,755 sq. yds. and on old base, 23,300 sq. yds.; sheet asphalt, new base, 36,990 sq. yds.; old stone pavement, 3,850 sq. yds.; wood block, 8,880 sq. yds.; repairing belgian block, 9,400 sq. yds. Newark, N. J., about \$500,000 worth of work. Elizabeth, N. J., \$620,000 worth of work (nearly four times as much as any year since 1913, when \$261,000 was spent). New Jersey State Highway Commission, about 100 miles, 50 of which is left over from the 1918 program, the amount to be spent this year approximating five and a half million dollars.

In New York State, Yonkers proposes 8,605 sq. yds. Richmond Borough, New York, \$300,000; Bronx Borough, "a materially larger amount than in 1918." Utica, \$200,000. Albany, \$136,000. Troy, 25 per cent to 33 per cent more than in normal years; "our expectation is based on the necessity of catching up with the program adopted prior to the war as well as providing profitable employment for idle labor."

STATISTICS FROM CITIES.

The city engineers of about three hundred cities have kindly furnished us with information as to the amount of pavement of each kind that should be constructed, resurfaced or repaired in their respective cities this year; together with other information, part of which is published elsewhere in this issue and the remainder of which will appear in later issues. The figures referred to we have summarized and totaled by districts, which figures are given below. The figures all represent square yards, the first figures in each case being the amount of work that should be done, the second figure (if any) representing the amount that probably will be done. In the questions submitted to the engineers, new construction was defined as including everything from subgrade up, including base where such was used. Resurfacing is renewing the entire wearing surface on the old base, where a concrete base is used, or placing new material over the entire area of the pavement when there is no concrete base. Repairing is replacing less than the entire area of wearing surface. Bituminous concrete is defined as "a pavement composed of stone, gravel, shell or slag, or combinations thereof, and bituminous materials, incorporated together by mixing methods"; while bituminous

macadam is defined as "a wearing course of macadam with the interstices filled by penetration methods with a bituminous binder."

New England States.

Sheet asphalt construction, 8,000; resurfacing, 16,000, 8,500.

Stone block construction, 83,000, 83,000; repairs, 10,000, 10,000.

Wood block construction, 2,900.

Bituminous concrete construction, 50,000, 28,000

Bituminous macadam construction, 164,500, 155,900; resurfacing, 25,000, 5,000.

Waterbound macadam construction, 27,000, 27,000; resurfacing, 17,000, 5,000; repairs, 8,800, 8,800.

Gravel construction, 90,600, 90,600; repairs, 17,600, 17,600.

Concrete construction, 232,300, 90,000.

Middle Atlantic States.

Sheet asphalt construction, 715,900, 605,000; resurfacing, 393,800, 285,800; repairs, 471,000, 450,000.

Brick construction, 582,600, 293,200; resurfacing, 95,300, 35,200; repairs, 149,400, 40,400.

Stone block construction, 315,800, 280,400; resurfacing, 4,700; repairs, 10,000, 9,000.

Wood block construction, 86,400, 51,400; repairs, 61,000, 51,000.

Bituminous concrete construction, 58,100, 5,000; resurfacing, 283,500, 185,000; repairs, 105,000, 80,000.

Bitulithic construction, 32,300, 30,800.

Bituminous macadam construction, 108,900, 78,900; resurfacing, 558,500, 443,100; repairs, 72,600, 35,600.

Waterbound macadam construction, 63,000, 15,000; resurfacing, 45,000, 35,000; repairs, 27,200, 27,200.

Gravel construction, 50,000, 48,000; resurfacing, 20,000; repairs, 14,200, 12,000.

Concrete construction, 184,400, 167,000; resurfacing, 6,000.

Miscellaneous pavements, 21,500, 8,000.

South Atlantic States.

Sheet asphalt construction, 35,000; resurfacing, 94,000, 94,000; repairing, 2,000.

Brick construction, 36,000; resurfacing, 15,000.

Stone block construction, 10,000, 10,000.

Wood block construction, 20,000, 20,000; repairs 20,000, 20,000.

(To be continued.)

THE MANUFACTURERS' AND THE CONTRACTORS' POINT OF VIEW.

By MAURICE B. GREENOUGH.*

The manufacturer of paving material shares the belief of all who are engaged in highway and street improvement that an unprecedented era of construction is before the country. Never before has the issue been so clean-cut as now. Experience during the war proved conclusively to the country that its transportation facilities are hopelessly inadequate either to expand in sudden emergencies or to keep pace with the increase in transportation demand that will accompany the coming industrial activity, without the addition of roads suitable for commercial transportation.

Already the significance of a lesson learned is being manifested by large bond issues for state road systems that have passed either the preliminary stages of approval at the polls or which are being prepared for that step. Activity is most keen in those states that heretofore have not been noted as road building states. Among

them, Illinois and Pennsylvania voters have approved bond issues of 60 and 50 million dollars respectively. The South Carolina Legislature is considering an issue of \$25,000,000; the Georgia Legislature, one of \$40,000,000, and a bill is nearly ready to go to the Tennessee Legislature calling for an issue of \$50,000,000.

Other states that have been road builders for some time and have the necessary machinery in existence for raising funds, are becoming active. For example, Ohio hopes to have \$7,500,000 available for 1919. Scarcely a day passes in which some new county bond issue is not proposed, most of them counties, like states, that before the war had done little or nothing in the way of systematic highway improvement.

The future, both immediate and more distant, is much more clearly defined in rural than in urban districts. In cities where unemployment is most manifest, public improvements are being urged as a means of taking up the slack of industrial employment during the reconstruction period. However, it is in the cities that the tendency to postpone work until prices shall have decreased is most seen.

The situation is an anomalous one, particularly from the manufacturer's point of view. He is confronted on the one hand with the necessity of employing labor at high prices and on the other with the manifest disposition of some, in fact many, city officials to counsel delay or lower estimates if the work is to be advertised immediately. The problem of the contractor is one with that of the manufacturer.

The position is not unreasonable for either manufacturer or contractor who assumes that if officials are looking to public improvements to solve the unemployment problems, then officials should permit the work to be estimated at prices that reflect the general opinion that wages for labor should not be materially lowered.

This statement bears no element of prophecy over the future of prices. Ultimately labor costs may fall; whether much or little, cannot be foretold at present; but if so, resources from which comes the money to pay for paving, likewise will be reduced. But assuming that they do fall, the lag between the cost of labor at the time of making paving materials for sale, or the time elapsing between filing bids and beginning work, will maintain high costs of paving work for some time yet.

Officials should therefore recognize the predicament of the manufacturer and contractor, and allow estimates that permit of ready sale of work. If readjustments are later to come, then both the manufacturer and contractor will be ready to readjust as they can without incurring the risk of serious financial loss.

On the other hand, some officials take the position that work should go forward regardless of cost. Such officials are those who see unemployment at first hand and realize the danger therein to community and public life. The governor of a large mid-western state recently urged every city, county and township to bond or tax itself to the limit, and push public improvements at going prices, rather than to risk the industrial unrest and its cost which would in all probability far exceed any petty saving made by haggling over a few cents per square yard at this time.

By gradual readjustment the price question may ultimately be solved to the satisfaction of all concerned, without impairing credits or business relations. Holding back, waiting for prices to fall, may mean that the whole economic structure of the country will fall with a crash, and between the two possibilities there can be no hesitation in choice.

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IMPROVING HILLSIDE STREETS.

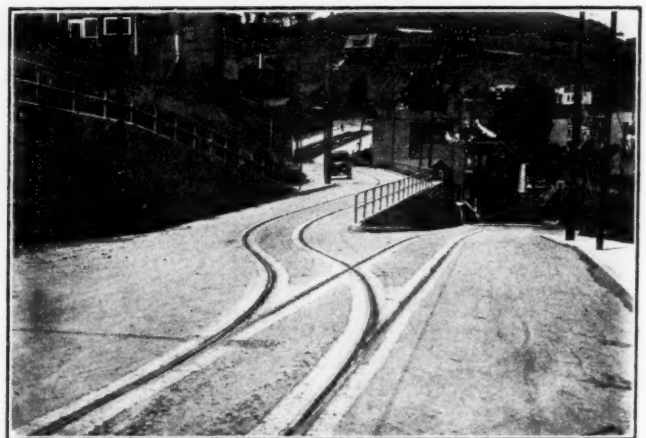
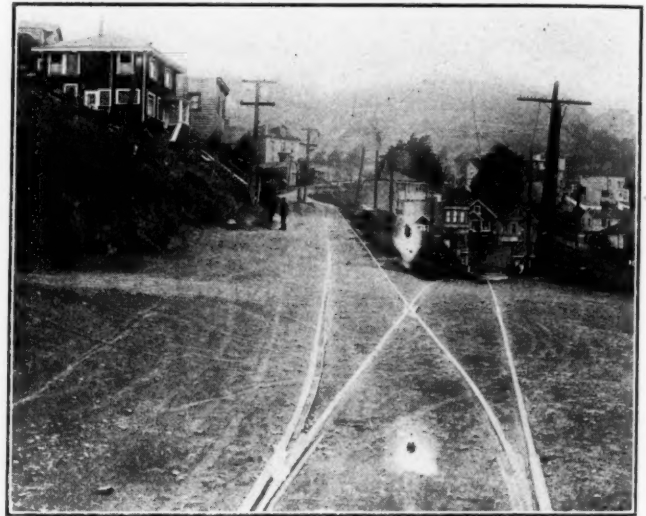
Two-level Streets, Switchbacks and Sunken Roadways Used on San Francisco Streets in Mounting Steep Hill Sides.

An illustration of the use of a two-level street in solving a side-hill street problem is furnished by Leavenworth street, San Francisco, the treatment being shown by the illustration below, Fig. 1. The roadway on the left leading to the upper level swings around into Francisco street, giving access to a district above, which had been almost inaccessible, the only approach having been over a 20½ per cent grade paved with a very dilapidated cobblestone pavement. The construction shown consists of a retaining wall 187 feet long which divides Leavenworth street into two levels, the lower one having a ten-foot sidewalk and the upper one a six-foot sidewalk, while the lower roadway is 32 feet wide and the upper one 17½ feet. The grade from Chestnut street (in the foreground of the illustration) to the retaining wall and for 50 feet further on the lower roadway descends at a 15.9 per cent grade, changing to a 6.8 per cent at the lower crossing of Francisco street. The upper roadway ascends on a 3.4 per cent grade. The 15.9 per cent grade is paved with brick on a four-inch concrete base.

In addition to dividing Leavenworth street as shown, the retaining wall crosses Francisco and Leavenworth streets diagonally to the further curb of the former, and a stairway is built in the face of this wall leading from the left-hand sidewalk on Leavenworth street at the lower level (beyond the retaining wall) up to the upper level immediately above.

The wall is of reinforced concrete of the cantilever type surmounted with a 4¼-foot parapet. The wall is 31.25 feet high at the highest point and 5.75 feet high at the lowest, including base and parapet. It is twelve inches thick at the top and batters seven inches in five feet of depth, giving a maximum thickness at the base of 3.86 feet. To insure against undue settlement in back-filling behind the wall, special precautions were taken in tamping. The fill, which was placed by means of wheelbarrows, was water tamped, the weep-holes in the

wall having been plugged temporarily to hold the water, and all the plugs were pulled simultaneously later on to insure a uniform settlement. The subgrade was rolled by



FIGS. 3 and 4—SWITCHBACK STREET IMPROVED BY RETAINING WALLS.



FIG. 1—RETAINING WALL SPLITS LEAVENWORTH STREET INTO UPPER AND LOWER LEVEL.

means of five-ton motor trucks first used empty and then loaded.

Grade is a more important matter in connection with roadways than with sidewalks. In the case shown in Figure 2, the street as originally built had a grade too steep for use by the street railway and objectionable for teams, and the railway made a detour. The city and the railway company shared the cost of remedying this by cutting down the roadway grade from 14.4 per cent to 10.9 per cent. The maximum depth of cut was 15 feet.

The sidewalks were not lowered, since this would have greatly depreciated the value of the buildings abutting on them as well as increased the cost. Instead, a retaining wall was built along each curb line, stairways at intervals connecting the sidewalk and roadway. Sewers

and other public utility underground structures were placed under the sidewalk.

The street railway company did the excavating, totaling about 11,500 cubic yards, and the city paid \$16,000 for the balance of the improvement.

Another improvement in hillside streets made at the expense of both city and railroad company is shown by Figures 3 and 4. Here the railway used a switchback (in the foreground) for ascending the hill. The track descending the hill occupied the entire width of the cut and was hardly practicable for vehicles. By slightly changing the track alignment and building retaining walls, the roadways were widened and the section made accessible for vehicles, and the appearance at this point was greatly improved.

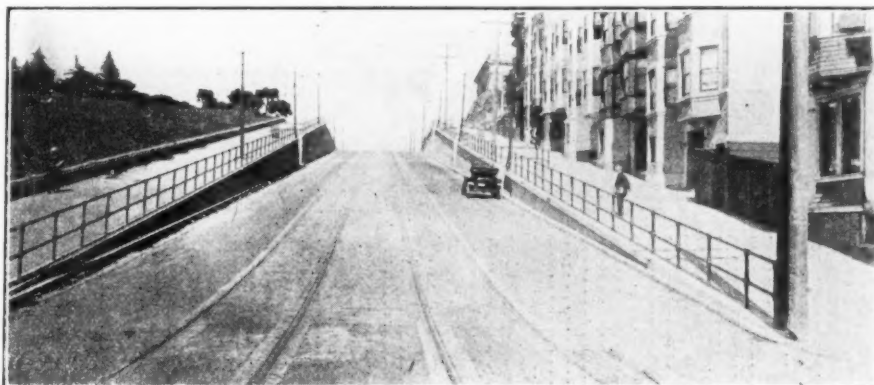


FIG. 2—ROADWAY LOWERED WITHOUT LOWERING SIDEWALKS.
At three points on the right and one on the left of the roadway are seen steps from roadway to sidewalk, with guard railings.

ASSESSMENTS FOR STREET IMPROVEMENTS

Various Classes of Improvements and Services for Which Different Cities Assess the Cost, the Cities That Make Assessments for Each, and the Percentages of Cost Assessed.

Last week we gave a summary of the practices of all cities of more than 30,000 population in providing revenue by means of taxes of all kinds, together with a discussion of the possibilities of reducing municipal expenses. A practice that may be considered as being strictly neither raising of revenue nor reducing expenses is the direct assessing on benefited property of the cost of public improvements and services.

So far as spending money for public works and services is concerned, a government is merely an agency through which a community acts co-operatively in order to secure advantages that it could not secure by individual action. It may be that the very performance of the service necessarily involves joint action, such as constructing and operating a sewer system, or that by such action the service is secured at less cost and more effectively. Also the service may be of value chiefly to individual properties, such as the paving of residence streets; or may benefit the entire community, such as flood protection or a city hall.

The government acts also as the agent for collecting the funds for carrying on these public benefits. In most cities the larger part of the total expenses are treated as being for the common good, and the necessary funds are obtained by levying upon all citizens in amounts depending not upon the benefit that they individually derive from the services, but upon their property holdings or on some other basis.

A large percentage of cities, however, assume that certain public works or services, chiefly those having to do

with the highways, are so largely of benefit to individuals whose property is adjacent thereto that they assess all, or a large part, of the cost directly upon such property. The money so collected may be considered as going not into the common pool, but directly from the party assessed to the one who constructs the utility or performs the service, the city acting as the agent for the individual (rather than for the community), whereby he secures the benefit at less cost and trouble and to his greater satisfaction than if each individually had contracted for the same.

The accompanying table shows to what extent each of the cities of more than 30,000 population makes direct assessment of cost of constructing the various classes of improvement connected with the street surface. (Assessment for other improvements will be considered in a later issue.) The data are obtained from the report of the U. S. Census Bureau and apply to the year 1917. The figures given therein may be summarized as follows:

In all, 219 cities are included in the list of those of more than 30,000 population. Of these, 55.7 per cent assess for opening streets, 41 per cent assessing the whole cost and the others a part of the cost only.

For grading streets, 57.1 per cent assess the abutting or benefited property, 38 per cent the entire cost and 19.1 per cent a part only.

For paving streets, 47.5 per cent assess all the cost and 25.2 per cent a part of the cost.

For paving alleys, 44.8 per cent assess all the cost and 26.4 per cent a part of the cost.

Dubuque	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
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"Either 50% or 100%, usually the latter, contingent upon the value of the property and the extent of the area benefited. "Asphalt on concrete base, 60 cts. per front foot; wood block, 70 cts.; bituminous macadam, 35 cts.; hazzam, 50 cts. per front foot for straight curb, 90 cts. for curved. "Certain improvements under the Board of Park Commissioners may be assessed. "Original paving only. "Original paving only; one-half cost of replacement. "Assessments collected in ten annual installments of 15 cts. per front foot on roadways 30 ft. wide or over; 10 cts. per front foot for roadways 15 to 30 ft. wide; 5 cts. for less than 15 ft. width. On streets with railway tracks the company is assessed 50% of cost of paving. "Not in excess of 10% of the assessed valuation of the abutting property. "Of adjudged benefits, usually between 50% and 100% of the cost. "Against benefited property. "According to benefits. "All cost in excess of \$5,000. "100% of original paving and 66% of repaving. "50% if constructed in connection with paving. "No uniform rate; special ordinance for each improvement. "Regrading, repaving, etc.; 98% less than cost of original improvement in Columbus; 1/2 cost in Springfield; not more than 50% in Cleveland. "Cannot exceed 25% of value of assessed property exclusive of improvements thereon. "Generally 66% by special agreement with property owner. "Or 50% by special agreement with property owner. "Not more than 50% of assessed value of property. "Up to \$3 per square yard and 1/2 remainder, if any. "66% for business streets.

Note: In all Illinois cities except Aurora and Joliet 100% of cost of "street betterments," and in Somerville, Mass., 50% of "adjudged benefits" from "street betterments," and in Worcester, Mass., 50% of cost of betterments, according to benefits. Of the cost of street parking, San Francisco assesses 50% to 100%; Indianapolis, 100%; Minneapolis, 100%. Of the cost of parks, San Francisco assesses 50% to 100%; Washington, D. C., 1/2 to 1/3 of cost; Minneapolis, 100%; New York, 93%; Fort Wayne may assess 100%. Indianapolis assesses certain improvement made by Park Commissioners.

For constructing curbs, 54 per cent assess all the cost and 28.7 per cent a part only.

For constructing sidewalks, 64.4 per cent assess all the cost and 19.2 per cent assess a part only.

Where no assessment is reported it is assumed that the improvement was paid for from the common fund.

ASSESSMENTS FOR PUBLIC SERVICES.

Quite a large number of cities assess directly on benefited properties the cost of certain public services rendered. A list of these is given below:

For sprinkling streets—The entire cost is assessed by Bridgeport, Hartford and Waterbury, Conn.; Augusta, Ga. (for unpaved streets); Boise, Ida.; Evansville, Ind.; Brockton, Chelsea, Haverhill, Lawrence, Lowell, Lynn, Malden, Pittsfield, Salem, Somerville, Springfield, Taunton and Worcester, Mass.; Duluth, Minneapolis and St. Paul, Minn.; Joplin and St. Louis, Mo.; Butte, Mont.; Auburn, Buffalo, Elmira and Syracuse, N. Y.; Columbus and Toledo, O.; Fort Worth, Tex.; Kenosha, Milwaukee, Oshkosh, Racine and Superior, Wis., Portland, Me., assesses 90 per cent.; Quincy, Mass., 50 per cent.; Fitchburg, Mass., assesses from two-thirds to three-fourths, varying with the width of the street. New Britain assesses 1½ cts. per front foot; Fall River, 2 cts.; Newton and Waltham, Mass., 3 cts.; Cambridge, Mass., 4 cts. Rochester, N. Y., that portion of the cost not paid by the street railway company.

Oiling streets—The entire cost is assessed by Pasadena and San Francisco, Cal.; Wichita, Kan.; Joplin and St. Joseph, Mo.; Buffalo, N. Y.; Cincinnati and Hamilton, O.; Williamsport, Pa.; Kenosha and Milwaukee, Wis., and Racine, Wis., part of the cost.

Removing snow from sidewalks—The entire cost is assessed by Des Moines, Cedar Rapids, Council Bluffs, Davenport, and Sioux City, Ia.; Binghamton, Buffalo, Elmira, Poughkeepsie, Rochester and Utica, N. Y.; Williamsport, Pa.; Kenosha, La Crosse, Madison, Milwaukee, Oshkosh and Racine, Wis.

Cleaning roadways—The entire cost is assessed by Akron, Dayton, Columbus, Toledo and Youngstown, O., and 50 per cent. of the cost by Rochester, N. Y.

Cleaning sidewalks—Fort Worth, Tex., assesses the cost.

Repairing sidewalks—Minneapolis, Rochester, Milwaukee and Oshkosh assess the entire cost, and Superior part of it.

Care of street parking—Pasadena, San Francisco and St. Paul assess the entire cost.

Planting shade trees—Minneapolis assesses the entire cost.

Care of shade trees—St. Paul and Newark, N. J., the entire cost.

Moth Extermination—The entire cost is assessed by Portland, Me.; Manchester, N. H., and all Massachusetts cities when done on private property.

Cutting Weeds—Entire cost by Los Angeles, Pasadena and Sacramento, Cal.; Boise, Ida.; Cedar Rapids, Council Bluffs, Davenport and Sioux City, Ia.; Topeka and Wichita, Kan.; Buffalo, N. Y.; Oklahoma City, Okla.; Kenosha, La Crosse, Madison, Milwaukee, Oshkosh and Racine, Wis.

Filling in lots—Entire cost assessed by Topeka, Kan.

* Improvements and services other than those connected with street surfaces will be given in a future issue.

EFFECTS OF HEAVY TRAFFIC

Weight of Heavily Loaded Trucks Using the Main and Residence Streets in Several Hundred Cities, and Damage Resulting from Such Use—Increased Thickness of Base Adopted or Recommended.

Among the items of information furnished to Municipal Journal by several hundred city engineers for this special paving number were some concerning the maximum weight of traffic using such streets and the measures taken by the city, if any, to prevent destructive effects of traffic on the pavements.

In reporting the weight of heaviest trucks that used their main thoroughfares, the average weight reported was about nine tons; but a number of cities reported much heavier weights than these, one reporting thirty tons and three reporting twenty tons. Quite a number named army trucks as being the heaviest users of their main thoroughfares. Some of the smaller towns, on the other hand, reported no trucks heavier than two or three tons. (In the questionnaire the informant was asked to give the weight of truck and load combined.)

A great many cities stated that the heaviest trucks used the residence streets as well as the main thoroughfares, but on the other hand, a great many reported that this was not the case. The average weight of trucks reported as using residence streets was about six and a half tons. Only two cities reported trucks heavier than fifteen tons using the residence streets, but quite a considerable percentage reported more than ten tons.

Although the main thoroughfares appeared to carry heavier trucks than residence streets, only a few of the cities reported any laws or traffic regulations forbidding heavy trucks to use any specified streets, the number so reporting being only twenty-two; and one of these reported that the restriction was not on account of the pavement but on account of congestion of traffic. Of

the others, six named boulevards and two named park drives as those that were restricted. Manhattan, Kan., stated that heavy traffic was excluded from asphalt streets in summer.

Moline, Ill., reports that, in an effort to regulate the use of streets by heavy trucks, regular traffic between fixed points is routed over those streets that are best able to stand the load. The same is reported from Marion, Ind., although difficulty is experienced in keeping the truck drivers to the designated routes. In the latter city much damage is done by the testing of trucks, the sand cushion on brick streets shifting and macadam and even tar macadam raveling. Aberdeen, Wash., limits the loads on plank streets to a maximum of 7,000 pounds.

In spite of the heavy traffic, the number of pavements that have been damaged thereby seems to be relatively small. Only about 18 per cent of the cities reported that the pavement base had been broken in any of their streets by heavy traffic, and only 40 per cent reported the wearing surface as having been injured; and several of these reported the damage as having been done to one street only. In many and perhaps the majority of cases the damage done to the pavement might have been anticipated because of the character of the pavement, in view of the burdens imposed by modern traffic. It was rather surprising to learn of the number of cities and towns where there are still to be found brick pavements without concrete base, and in at least one city granite blocks were laid on a sand base and had been damaged by traffic on this account. Damaged brick pavements were reported as being laid on slag, gravel, brick laid flat, and in some cases upon the natural soil. Two

EFFECTS OF HEAVY TRAFFIC.

Approximate weight of heaviest trucks using			Where pavements have been damaged by heavy trucks			Because of increasing weight of trucks				
State and City.	Main thoroughfares, tons.	Residence streets, tons.	Are there any streets which heavy trucks are forbidden to use?	Was the base broken?	How thick was such base?	Was the surface injured?	Of what material was it?	Has thickness of base been increased?	How much?	If not, is such increase contemplated or recommended?
Alabama:										
Gadsden	11	11	No	No	...	No	.....	No	.....	No
Troy	20	4	No	...	...	...	.....	No	.....	Yes, from 4" to 6"
Arizona:										
Globe .....	..	..	...	...	...	...	.....	...	.....	.....
Arkansas:										
Fort Smith	10	¾ to 1½	No	Yes	2" sand	Yes	Bad brick	...	.....	Concrete base according to the traffic
California:										
North Little Rock....	5	3 to 5	No	Yes	5"	Yes	Concrete	No	.....	Yes
Berkeley	15	15	No	Yes	5" & 6"	Yes	Asphaltic	No, but have increased cement content	.....	Prefer to use extra care on subgrade
Colorado:										
Ontario	10	4	No	No	Concrete 4" Macadam 5"	No	.....	No	.....	{ Recommend increasing from 4" to 5", & mix from 1:2½:5 to 1:2:4
Palo Alto	10	10	No	No	4" largely 4" & 6"	No	.....	No	.....
Pomona	10 to 12	..	Yes ^a	Yes	...	Yes	Asphalt	No	.....
Redwood City	15	..	Only by request	Yes	Asphalt macadam	Yes	Asphalt macadam	No	Minimum 6½"	
San Luis Obispo	7 or 8	..	No evidence	...	8"	Yes	Asphalt macadam	No	.....
Santa Maria	9	3 to 9	No ^b	No	...	Yes	Asphalt macadam	No	.....	No
Stockton	7½	3½	No	No	...	No	.....	No	.....	Will investigate
Upland	12	12	No	No	...	No	.....	No	.....
Connecticut:										
Longmont	8 to 9	2 to 5, some- times 9	No ^c	...	...	...	.....	No	.....	.....
Florida:										
Pueblo	10 or 11	3	No—no ordinances	...	...	...	.....	No	.....	No
Salida	3	3	No	...	...	...	.....	No	.....	No
Georgia:										
Ansonia	10	5	No	...	...	...	.....	No	.....	.....
Manchester	12	8	No	...	...	...	.....	No	.....	.....
Stamford	12	12	No	No	...	No	.....	No	.....	No
Winsted	10 to 12	10 to 12	No ^e	No	...	...	.....	...	.....	.....
District of Columbia:										
Washington	15	15	Park drives	No	...	...	.....	No	.....	No
Idaho:										
De Land	4½ to 5	3½ to 4½	No	...	...	...	.....	.....	.....	.....
Fort Myers	5	..	No	...	...	...	Brick, sand base	No	.....	Yes
Sanford	5	..	No	...	...	Yes	Brick, sand base	.....	.....	Yes
Illinois:										
Americus	6	6	No	No	...	No	.....	Yes	50%	.....
Indiana:										
Boise	8	8	No	No	...	No	.....	No	.....	Yes, abt. 20% thicker
Pocatello	5	5	No	No	...	...	.....	No	.....	(^f)
Iowa:										
Benton	2	2	No	No	2-course bk.	No	Small pavers	.....	.....	Yes
Canton	12	5	No	Yes	...	Yes	Brk. 2" sand cushion, asphalt fill	No	.....	Yes
Champaign	8½	1 to 8½	No	...	...	...	.....	No	.....	No
Kansas:										
Chicago Heights	12	6 to 8	Yes	No	...	Yes	By tractors with lugs	No	.....	From 4" & 5" to 6" & 7" May in future
Danville	8	8	No	No	...	...	.....	No	.....	Contemplates 20%
De Kalb	5	5	No	No	...	...	.....	No	.....	No
Dixon	7	7	No	No	...	...	.....	No	.....	Yes
Missouri:										
East St. Louis	15	8	Yes	Yes	...	...	.....	No	.....	6" for heavy traffic
Freeport .....	..	..	No	No	...	...	.....	No	.....	.....
Fulton	8	3 to 8	No	No	...	...	.....	Yes	From 4" to 6"	.....
Harvard	3	1 to 2	No	No	Boulevard	...	.....	No	30 to 40% 1 inch	.....
Highwood	12	1 to 6	No	No	...	...	.....	Yes	.....	.....
Joliet	12	12	No	No	...	Yes	Macadam	Yes	.....	Yes
La Grange	14	14	No	No	...	Yes	Tar macadam	No	.....	No
Marion	6	3	No	No	...	Yes	Asphalt, 50-70 penetration	Yes	5" to 6" use mortar cushion for brk.	.....
Moline	10	8	(g)	Not known	...	Yes	.....	Yes	.....	.....
Minnesota:										
Naperville	8	8	No	Yes	6"	Yes	Asphaltic concrete	.....	No	.....
Oak Park	3 to 5	3 to 5	No	Yes	4" to 6"	Yes	Brick, sand filler	.....	.....	.....
Savannah	4	..	Yes	Yes	.....	Yes	Brick and asphalt	Yes	From 7" to 12"	Yes
Winnetka	5 to 15	5 to 15	One	Yes	.....	.....	.....	.....	.....	.....

EFFECTS OF HEAVY TRAFFIC—(Continued).

Approximate weight of heaviest trucks using			Where pavements have been damaged by heavy trucks			Because of increasing weight of trucks		
thorough-fares, tons.	Residence streets, tons.	Are there any heavy trucks forbidden to use?	Was the base broken?	How thick was base?	Was the surface injured?	Of what material was it?	Has thickness of base been increased?	If not, is such increase contemplated or recommended?
Indiana:								
Bedford	5	No	...	...	...	...	...	...
Connersville	10	No	...	...	...	...	...	...
Covington	8 to 10	No	...	...	...	...	...	...
Crown Point	5	No	Where worn too low	5" to 6"	Only natural wear	Asphaltic macad.	No	Recommend it
East Chicago	14	No	Yes	5"	Yes	Brick	No	Yes
Frankfort	5	No	...	...	...	...	No	In certain cases
Gary	20	Boulevards	in macadam	7" to 9"	Yes	Tar macadam	No	...
Jasper	3	No	...	...	...	...	...	...
Kendallville	6	None except those having lugs	...	...	...	...	Yes	6" to 8" for conc.
Marion	Army test trucks	...	...	...	...	...	...	...
Noblesville	6	No	(b) No	...	Yes	Tar mac. & mac.	...	...
Peru	22½	No	...	...	Yes	Tar macadam	No	...
Seymour	8 to 10	No	...	...	...	...	No	Recommend 7" to 8"
South Bend	13	Boulevards	...	...	...	...	No	1" to 2" where traffic is heavy
Terre Haute	10	No	...	...	Yes	Asph. bk. & conc.	No	...
Iowa:								
Atlantic	5 to 7	No	...	...	...	...	...	Yes
Cedar Rapids	7	No	...	5"	Not materially	Brick	No	...
Centerville	5	No	Yes	...	...	...	Yes	1" to 2"
Clinton	7	No	...	...	...	...	No	Yes
Denison	5	No	...	...	...	...	No	Yes
Fairfield	7	No	...	...	...	...	No	Yes
Jefferson	4	No	...	...	...	Gravel	No	No
Keokuk	5	1 avenue	No	...	Yes	Asphalt macadam	No	No
Marshalltown	8	No	...	...	...	...	...	If heavy trucks increase
New Hampton	7	No	...	...	...	...	...	...
Sioux City	14	No	...	...	Yes	Asphalt	Yes	From 4" to 6"
Winterset	5	No	...	...	...	...	...	...
Kansas:								
Abilene	12	No	...	...	...	...	Yes	From 4½" to 5"
Arkansas City	3	No	No	4"	Yes	Vitrified brick	No	No
Atchison	6	No	No	...	Yes	Brick with no base	Yes	From 4" to 6"
Chanute	6 to 8	No	No	...	Yes	Oiled macadam	Yes	From 4" to 6" for heavy traffic
Emporia	10	No	Yes	4"	Yes	Asphaltic concrete	No	Yes & reinforce them with steel
Fort Scott	6	No	Yes	4"	Yes	Brick	No	No
McPherson	2	No	No	...	No	...	No	Yes
Manhattan	8 to 10	In summer asphalt streets	No	...	Somewhat	Asphalt	No	No
Parsons	3 to 5	No	Yes	4"	Yes	1:3.5 concrete	Yes	From 5" to 6" in Will continue to increase business streets
Topeka	7½	No	...	...	Yes	Brick, sand filler	Yes	1" to 2"
Kentucky:								
Covington	1	No	No	...	Yes	Asphalt & brick	No	Yes
Louisiana:								
Kentwood	2	No	No	...	No	...	No	No
Lake Charles	6	No	No	...	No	...	No	No
New Orleans	10	...	No	...	Yes	Sheet asphalt	No	On heavy traffic streets
Maine:								
Augusta	6	No	...	...	Yes	Waterbound & gravel	Yes	Depends on sub soil
Lewiston	8	No	No	...	Only wear	...	No	...
Rockland	2	No	...	...	...	...	...	...
Waterville	12	No	No	...	Yes	Asphalt	No	...
Winstons	5	No	No	...	...	...	...	...
Maryland:								
Westminster	Regular army trucks	No	Yes	1 ft. central taper to 6" sides	Yes	Waterbound mac.	No	Possibly

Westminster	Regular army trucks	1 to 8	No	Yes	taper to 6" sides	Yes	Waterbound mac.	No	Possibly
Michigan:									
Adams	10	6	No	No	...	No	Asphaltic preparation	No	Expect to this year
Brockton	12	7	No	No	...	No	...	No	To 7" for concrete
Holyoke	12	..	No	No	...	No	...	No	...
Lynn	5 to 7	3 to 5	No	No	1" to 4 1/2"	No	...	No	...
Peabody	12	1 to 5	No	No	...	No	...	No	...
Somerville	5 to 10	1 to 5	No	No	...	No	...	No	...
Michigan:									
Ann Arbor	10	3	No	No	...	No	...	No	...
Battle Creek	11	11	No	No	...	No	...	No	...
Cadillac	10	10	No	No	...	No	...	No	...
Dowagiac	6	6	No	No	...	No	Waterbound mac.	No	...
Escanaba	5	Small trucks	No	No	...	No	...	No	...
Hastings	13	13	No	No	6"	Yes	Asphalt	No	Yes 9"
Highland Park	13	10	No	Yes	...	Yes	...	No	...
Houghton	10	8	No	No	...	No	...	No	...
Lansing	8	8	No	No	...	No	...	No	...
Manistee	10	10	No	No	...	No	...	No	...
Sault Ste. Marie	10	10	No	No	...	No	...	No	...
South Haven	5	6	No	No	...	No	...	Yes	...
Minnesota:									
Hibbing	...	...	No	Yes	5"	No	...	No	Yes, to 6"
Montevideo	4	...	No	No	...	No	...	No	...
Northfield	...	...	No	Yes	6"	Yes	Concrete	No	Recommend that loads be restricted
Pipestone	8	5	No	Yes	...	Yes	...	No	...
St. Cloud	7	7	No	No	...	No	...	No	...
Virginia	6	6	No	No	...	No	...	No	...
Mississippi:									
Clarksdale	12	6	No	No	...	No	...	No	...
Tupelo	5	1 1/2	No	No	...	No	...	No	...
Vicksburg	7	3	No	No	...	No	...	No	...
Missouri:									
Boonville	5	1/2	Yes	No base	...	Yes	Brick	Yes	...
Carrollton	5	5	No	No	...	Yes	Asphalt	Yes	...
Independence	8	4	No	No	6"	Yes	Brick, wood blocks, concrete	Yes	...
Kansas City	16	16	No	Yes	...	Yes	Rock and gravel	Not yet	...
Kirkwood	10	10	No	No	...	Yes	Waterbound mac.	Yes	...
Sedalia	8	6	No	No	...	Yes	...	No	...
Springfield	13	8 or 9	No	No	...	Yes	...	Yes	...
Washington	6	3	No, but there should be	Yes	7"	Yes	...	Yes	...
Montana:									
Billings	12	12	No	In some places	4" concrete	Shifted	Bitulithic	Yes	...
Nebraska:									
Alliance	1 1/2	1	No	No	...	No	...	No	...
Columbus	5	5	No	No	...	No	...	No	...
Fremont	5	5	No	No	...	No	...	No	...
Grand Island	6	6	No	Yes	4"	Brick wearing on edge	Brick	No	...
Lexington	3	3	No	No	...	Yes	All kinds except granite block	Yes	...
Lincoln	13	13	No	No	...	Yes	Amesite	No	...
New Hampshire:									
Nashua	14	14	No	No	...	Yes	Waterbound mac.	Yes	...
New Jersey:									
Bayonne	14	14	No	No	...	Yes	...	Yes	...
Bordentown	10	6	No	No	...	Yes	...	Yes	...
Bound Brook	30	12 1/2	No, but there should be	In some cases	8"	Yes	...	No	...
Camden	8	5	No	No	...	Yes	Bitulithic	Yes	...
East Orange	10	3	No	No	...	Yes	Macadam	No	...
Metuchen	..	..	No	No	...	Yes	...	No	...
New Brunswick	10	5	No	No	...	No	...	No	...
Newton	8	8	No	No	...	No	...	No	...
Phillipsburg	10	5 to 5	No	No	...	(1)	Brick	No	...
Plainfield	12	5	No	Not known	...	Yes	...	Yes	...
Somerville	10	2	No	No	...	Yes	Waterbound mac.	No	...
West New York	10	8	No	Yes	5"	No	...	Yes	...
West Orange	10	5	No	No	...	No	...	No	...
Westfield	12	5	No	No	...	Yes	...	Yes	...
New Mexico:									
Roswell	5	5	No	No	...	Yes	...	No	...
New York:									
Batavia	3 to 5	3	No	No	...	Yes	Brick & macadam	No	Now investigating
Binghamton	10	10	Yes	Yes	6"	Yes	Brick	No	Yes, to 10"
Buffalo	12	2 to 7	Yes	Yes	6"	Many small cracks	Generally asphalt	Yes	Up to 9"

EFFECTS OF HEAVY TRAFFIC—(Continued).

Approximate weight of heaviest trucks using			Where pavements have been damaged by heavy trucks			Because of increasing weight of trucks				
State and City.	Main thorough-fares, tons.	Residence streets, tons.	Are there any heavy trucks forbidden to use?	Was the base broken?	How thick was such base?	Was the surface injured?	Of what material was it?	Has thickness of base been increased?	How much?	If not, is such increase contemplated or recommended? Use 6" base, 1:2½:5
New York (Continued):										Recommend for some sts.
Geneva.....	11	8 to 10	No	No	...	Yes	Brick	No	.....	Yes
Herkimer.....	10	3	No	No	...	Yes	Brick	No	.....	No
Hudson.....	8	4	No	No	...	Yes	Brick	No	.....	No
Jamestown.....	6 to 7	2 to 3	No	No	...	Yes	Asphalt, concrete, macadam base	Yes	From 6" to 8" in heavy-traffic sts.	Yes
Lancaster.....	7	4	No	Yes	4" to 6"	Yes	Asphalt, concrete, macadam base	.....	.....	Not at present
Queens Borough, N. Y.	24	9	No	.....	.....	.....	.....	.....	.....	If traffic requires
Ogdensburg.....	5	...	No	.....	.....	.....	.....	No	.....	Not at present
Olean.....	No very hvy trucks	...	.....	.....	.....	.....	.....	No	.....	On new work or resurf'g
Plattsburg.....	2	2	.....	.....	.....	.....	.....	No	.....	No
Port Jervis.....	7	7	.....	.....	.....	.....	.....	No	.....	Contemplated
Sidney.....	4	4	No	.....	.....	Yes	Asphalt oil	No	.....	.....
Southampton.....	8	5	No	.....	.....	Yes	Brick	No	.....	.....
No. Tonawanda.....	12	6	No	.....	.....	.....	.....	No	.....	.....
North Carolina:										
Monroe.....	5	2	No	.....	.....	.....	.....	No	.....	.....
North Dakota:										
Fargo.....	5	5	No	.....	.....	.....	.....	No	.....	.....
Minot.....	...	4	No	.....	.....	.....	.....	No	.....	.....
Ohio:										
Akron.....	10	About 3	No	Yes	4"	Yes	Brick	Yes	To 6" on residence, 8" on main sts.	.....
Bellefontaine.....	10	...	No	.....	.....	Yes	Brk. without base & brick with soft filler	No	.....	Yes
Conneaut.....	15	15	No	No	.....	Yes	4" brick	Yes	.....	.....
Coshocton.....	4	3	No	No	.....	Slightly	Brick	No	.....	No
Delaware.....	5	8	No	Yes	4"	Yes	.....	No	To 6" with sand cement cushion on res. sts.; main	No
East Cleveland.....	15	4	No	.....	.....	.....	.....	Yes	.....	.....
Eaton.....	12	8	No	No	.....	Yes	Asphaltic concrete	Yes	1½"	.....
Findlay.....	14	14	No	No	.....	Yes	Asphalt block	...	No	No
Ironton.....	7	7	No	No	.....	Yes	Sheet asphalt	...	No	.....
London.....	12	3	No	Yes	6"	Yes	.....	To 8" & mix from 1:3:6 to 1:2½:4	No	Recommend
Lorain.....	18	8 to 10	No	Yes	.....	Yes	Brick	No	.....	Yes
Maryville.....	8	4	No	No	8"	Yes	Gravel	No	.....	On clay soil, not gravel
Middleton.....	12	12	No	No	.....	Yes	Brick	No	.....	No
Mount Vernon.....	3	3	No	Yes	6" concrete	Yes	Brick	No	.....	Yes
Sandusky.....	12	5	No	.....	.....	.....	.....	No	.....	No
Sciotoville.....	12	3	No	No base	.....	.....	.....	Yes	2"	.....
Steubenville.....	12	...	No	.....	.....	.....	.....	No	.....	.....
Troy.....	10	1	No	.....	.....	Yes on acct of settlement	Brick	No	.....	.....
Urbana.....	6	...	No	.....	.....	.....	.....	Yes	To 6"	Recommend not less than 6" concrete
Washington.....	9	...	No	.....	.....	Some Depressions	Brick	.....	.....	Yes
Xenia.....	4	2	No	Few places	5"	.....	Brick	No	.....	Have recommended same
Zanesville.....	10	...	No	.....	.....	.....	Brick	Yes	2"	.....
Oklahoma:										
Enid.....	10	6	No	.....	.....	.....	.....	No	.....	.....
Hobart.....	15	...	No	.....	.....	.....	.....	No	.....	No
Pennsylvania:										
Altoona.....	12	12	No	No	Sunken in spots	Yes	Brick	No	.....	.....
Berwick.....	12½	...	No	Yes	5"	Yes	Brick	Yes	From 5" to 6"	.....
Bloomington.....	10	5	No	No	.....	Yes	.....	Not yet	.....	Yes
Butler.....	10	...	No	No	.....	Yes	Poor brick	...	.....	For new work recommend 5" to 6" base
Carlisle.....	...	Heaviest army trucks	No	.....	.....	.....	.....	.....	.....	.....
Clearfield.....	8	8	No	.....	.....	Yes	Brick on slag or gravel	Yes	From 9" to 12"	Considering it
Duquesne.....	...	...	No	.....	.....	Yes	.....	No	.....	.....
Ellwood.....	6	6	No	No	.....	Slightly	Macadam & gravel	No	.....	Yes
Freeland.....	4 to 5	1½ to 2	No	No	.....	Yes	Brk. on slag base, sand cushion	Not yet	.....	Yes
Greensburg.....	12	8 to 9	No	Compressed out of shape	6" to 8"	Yes	.....	No	.....	Contemplate using 6" concrete base
Harrisburg.....	Heaviest U. S. Gov. tr'ks	2 to 7	No	No	.....	No	.....	No	.....	.....

Hazleton	5	1/2 to 5	No	...	...	...	No	...	No (m)
Jeanette	12	3	No	...	...	...	No	...	Not at present
Lansford	5	5	No	...	...	...	No	...	Now 6 1/2" to 8"
Lebanon	5	5	No	...	...	...	Yes	...	...
Lehigh	5	5	No	...	...	...	Yes	...	...
Norristown	8 1/2	1 1/2	No	...	...	...	Yes	...	...
North Braddock	10	3	No	...	...	...	Yes	...	...
North East	20	5 to 8	No	...	...	...	No	...	...
Philadelphia	10 to 20	...	No	...	...	...	No	...	...
Pittsburgh	10	1 to 5	No	...	...	...	No	...	...
Punxsutawney	7	1 1/2 to 12	No	...	...	...	No	...	...
Reading	12 & 14	...	No	...	...	...	No	...	...
Roversford	10 to 12	...	No	...	...	...	No	...	...
Schuylkill	4	...	No	...	...	...	No	...	...
Sewickley	15	...	No	...	...	...	No	...	...
Shippensburg	5	...	No	...	...	...	No	...	...
Somerset	9	...	No	...	...	...	No	...	...
Waynesboro	3	...	No	...	...	...	No	...	...
West Homestead	8	...	No	...	...	...	No	...	...
Williamsport	9 1/4	...	No	...	...	...	No	...	...
York	10	...	No	...	...	...	No	...	...
South Carolina:									
Columbia	...	...	No	...	...	...	Not yet	...	...
South Dakota:									
Madison	5	...	No	...	...	...	No	...	...
Mitchell	4	...	No	...	...	...	No	...	...
Tennessee:									
Greenville	7	...	No	...	...	...	No	...	...
Lebanon	8	...	No	...	...	...	No	...	...
Union City	3	...	No	...	...	...	No	...	...
Texas:									
Dallas	12	...	No	...	...	...	No	...	...
Palestine	3	...	No	...	...	...	No	...	...
Plainview	6	...	No	...	...	...	No	...	...
San Angelo	7	...	No	...	...	...	No	...	...
Utah:									
Logan	8	...	No	...	...	...	No	...	...
Murray City	5 1/4	...	No	...	...	...	No	...	...
Ogden	8	...	No	...	...	...	No	...	...
Provo	...	...	No	...	...	...	No	...	...
Richfield	16	...	No	...	...	...	No	...	...
Salt Lake City	6	...	No	...	...	...	No	...	...
Virginia:									
Danville	6	...	No	...	...	...	No	...	...
Fredericksburg	3	...	No	...	...	...	No	...	...
Martinsville	10	...	No	...	...	...	No	...	...
Suffolk	8	...	No	...	...	...	No	...	...
Vermont:									
Rutland	8	...	No	...	...	...	No	...	...
Washington:									
Aberdeen	9 1/2	...	No	...	...	...	No	...	...
Chehalis	9	...	No	...	...	...	No	...	...
Olympia	...	...	No	...	...	...	No	...	...
Raymond	10	...	No	...	...	...	No	...	...
Seattle	...	...	No	...	...	...	No	...	...
Walla Walla	12	...	No	...	...	...	No	...	...
Wenatchee	9	...	No	...	...	...	No	...	...
Yakima	10	...	No	...	...	...	No	...	...
West Virginia:									
Kenner	10	...	No	...	...	...	No	...	...
Wisconsin:									
Appleton	5	...	No	...	...	...	No	...	...
Ashland	5	...	No	...	...	...	No	...	...
Baraboo	7	...	No	...	...	...	No	...	...
Beloit	10	...	No	...	...	...	No	...	...
Edgerton	5	...	No	...	...	...	No	...	...
Fond du Lac	10	...	No	...	...	...	No	...	...
Janesville	5	...	No	...	...	...	No	...	...
Jefferson	10	...	No	...	...	...	No	...	...

For footnotes, see page 160.

EFFECTS OF HEAVY TRAFFIC—(Continued).

State and City.	Approximate weight of heaviest trucks using		Where pavements have been damaged by heavy trucks			Because of increasing weight of trucks		
	Main thoroughfares, tons.	Residence streets, tons.	Are there any streets which heavy trucks are forbidden to use?	Was the base broken?	How thick was such base?	Was the surface injured?	Of what material was it?	Has thickness of base been increased?
Marquette	10	10	No	...	...	...	...	No
Oshkosh	10	10	No	...	5"	Yes	Asph. & gran. blk.	No
Superior	10	6	No	A few places	...	Yes	Crushed granite & asphalt	Yes
Waukesha	15	...	No	No	...	Yes	Brick	No
Wausau	10	6	No	Not much	...	Yes	Asphaltic concrete	No
West Allis	12	8 to 12	No	...	...	Yes	...	No
Wyoming	6	4 to 6	No	...	...	...	...	No
Cheyenne	10	10	No	...	...	...	...	...
Sheridan	...	...	No	...	...	...	...	No
Canada	...	...	No	...	...	...	...	...
Galt, Ont.	15	2	No	...	...	...	...	No
London, Ont.	13	...	No	...	...	...	...	...
Ottawa, Ont.	8	...	Only one street	No	...	Yes	Asphalt	...
Regina, Sask.	7	...	No	No	...	Yes, rutted	Bitulithic	...
St. John, N. B.	5	...	No	No	...	Yes	Tar macadam	...

^aNot on account of pavement, but congestion of traffic. ^bBut will be as soon as ordinance is drafted. ^cTractors with lugs are forbidden use of paved streets. ^dNo pavements have been damaged perceptibly, but some bridges and viaducts have. ^eNo, but our macadam does not stand up under truck traffic. ^fStandard practice is 4", think it should be at least 6". ^gRegular traffic between fixed points is routed over streets best able to stand the load. ^hShifting of sand cushion on brick streets, raveling on macadam or tar macadam. ⁱNot sure it was caused by trucks. ^jNot at present, but a traffic study is being made to that end. ^kAdvise 6" concrete or heavier, according to nature of sub-base. ^lThink it is worn out faster by heavy trucks than by light traffic. ^mWould recommend 6" concrete base and brick laid to form a monolithic pavement. ⁿOnly to extent of wearing a "rut" from continuous travel in one place. ^o4 x 12 16-ft. joists, 2 ft. on c.; 4 x 12 deck.

cities in Washington report plank pavements damaged by army trucks. Two cities in Kansas report brick pavements damaged by circus wagons, one a two-course brick and the other on a four-inch base. Sheet asphalt pavements were of course provided with a base in most instances, but the wearing surface was injured by the traffic in spite of this. A considerable number of pavements injured were bituminous macadam, with a few water-bound macadam and gravel pavements.

Replying to the question whether, because of the increasing weight of trucks, the city had increased the thickness of base of its pavements, only 49 replied that they had done so. Quite a number of these reported increase in the thickness up to six inches from a less thickness, but several have begun laying much heavier base. For instance, Winnetka, Ill., increased the base to 12 inches; Kendallville, Ind., South Haven, Mich., Washington, Mo., Queensboro, N. Y., Akron, O., East Cleveland, O., Norristown, Pa., and Suffolk, Va., have increased the thickness to 8 inches; Camden, N. J., to 10 inches; Clearfield, Pa., to 12 inches. It is presumed that these heavier bases are used where the heavier traffic is expected, and this is stated in a number of replies.

New Haven, Conn., in some cases of heavy traffic streets where the ability of the sub-surface to withstand the load is doubtful, uses reinforcement in the six-inch concrete base. One engineer is hesitating about increasing the thickness of base in paving work in the hope that the state (Pennsylvania) will place a reasonable limit upon the weight of trucks allowed to use the highways; and an engineer of a Minnesota city also recommends that loads be restricted rather than that the base be increased. A few of the cities have increased the richness of the concrete used for pavement base, in some cases instead of increasing the thickness and in other cases in addition to such increase.

Quite a number of the engineers replying expressed it as their opinion that, although their cities had not yet adopted a greater thickness of base than that in use, such increase was advisable, a number reporting that they had recommended it. In all, 95 engineers reported that an increase in thickness of base was either contemplated by their city or was recommended by them.

With 12-ton, 15-ton and 20-ton trucks and loads becoming more and more common, and even 25-ton and 30-ton loads using the highways, it is apparent that it will be only a few years before the great majority of our cities will find their main highways rapidly going to pieces. Of the several hundred cities reporting, 40 per cent have already noticed the surface of at least one street being injured by the heavy traffic, while nearly half that number have found the base of the pavement broken at one or several points. Undoubtedly there are an even greater number of places where the base has been cracked but the damage has not yet made itself evident on the surface. There appears to be no inherent limit to the weight of trucks and their loads, and no matter how strong pavements are made, it is possible to produce a truck that will impose too heavy a load upon them. It seems to us that, while engineers should increase the thickness of pavement base and the nature of wearing surface so as to provide for carrying any reasonable load, on the other hand, state or federal regulation should set a limit to the load that can legally be carried over our highways. Tax-payers should not be asked to furnish rights of way for vehicles which may in time attain the weight and proportions of freight cars, and compete with these vehicles, whose operators pay for the construction and upkeep of the right of way from their own rather than from the public treasury.

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ASSESSING PAVING COSTS.

The past few years have, we believe, seen a considerable increase in the practice of assessing the cost of street paving against abutting property. There are still a great many cities that pay for all roadway paving out of the general treasury, but the figures given in another article in this issue indicate that nearly three-fourths of the cities of the country of more than 30,000 population assess all or a part of this cost. In addition, a little more than half of the cities assess the cost of opening and grading streets.

Where the property owner must pay all or a part of the cost, there is generally a provision that at least a majority of the owners on a given block must consent to the paving of this block, which in some cases causes a delay of the paving because of a few obstructionists. On the other hand, where the paving is paid for from the public treasury, there is generally necessitated a comprehensive paving program and the voting of bonds for the same, which frequently leads to even more delay. In some cases the city would exceed its debt limit should it attempt to pay for all paving that should be done and would thus be precluded from carrying out other necessary improvements. On the whole, the arguments and experience appear to be in favor of assessing the cost of paving, or at least a considerable part of it, the chief argument in opposition being that the paving of a main thoroughfare that is essential to the well-being of an entire community may be prevented by the unwillingness of the abutting property-owners to consent to the same.

From the point of view of equity, it appears to us, as we have several times stated in the past, that the practice which would be most fair and just to all concerned would be to assess on all residence property the cost of the type of road that would be fully adequate for the local uses of such property, any additional cost necessitated by the use of the street as a thoroughfare being provided for from the general treasury. In the case of business property, while the street is used as a thoroughfare, the fact that it is so used is of direct financial benefit to the businesses abutting thereon and it would seem perfectly proper and just that they should pay the entire cost of such pavement, unless the street is used largely by through traffic, which does not benefit the businesses along the highway, the vehicles using

the same being entirely through traffic between cities or other sections outside of the city in question.

The simplest method of applying this idea would seem to be the plan adopted by several of the cities, as noted in the table, of assessing a certain cost per front foot for residence property and another cost for business property, with possibly a division of each into first and second class, depending upon the class of residences along the street or of the businesses benefited by the traffic on such street. This has been modified in a few cities by permitting the payment of the assessment in five or ten annual installments, thus making the payment easy for the property owner.

TO PAVE OR NOT TO PAVE.

Although the opinions of the eleven engineers covering all sections of the United States that are published in the leading article this week do not all agree as to the amount of paving that will be done in 1919, they at least all recognize that a very considerable amount *should* be done. Probably every city and town in the country omitted last year to do work that they would have done had conditions been different. Moreover, in a number of cities and along several of the cross-country highways the wear on pavements has been more than normal because of the unusual number and weight of army trucks and other vehicles engaged in war work. As the engineer of Troy, N. Y., says, in anticipating a paving program this year 25 per cent to 33 per cent greater than in normal years, "our expectation is based on the necessity of catching up with the program adopted prior to the war, as well as providing profitable employment for idle labor."

In state work, construction has fallen even further behind the program of two years ago than in the generality of city work. Take for instance the matter of road construction utilizing the federal aid provided by Congress. Projects were approved for the construction of about 7,870 miles of roads, for aid in building which Congress had appropriated \$48,500,000, but of this total less than 45 miles have been constructed. The remaining 7,825 miles has been approved of and the government contribution is available to aid in paying for its construction. The construction of these roads would involve the expenditure of about \$56,172,000. Not a single state has constructed a mileage of federal aid roads that even approximates that approved by the government for federal aid.

Figures from perhaps a quarter of the cities of the country show that there is need in that number of more than sixteen million square yards of paving this year, and it is encouraging to learn that these cities have already planned to construct about half of this amount.

There can be little doubt that practically all of this needed paving work would go ahead with the opening of the building season but for one thing—the feeling on the part of many, if not most officials, that prices will fall within the next few months, and that by holding off construction until fall or even until next year if necessary, considerable saving can be made in cost of construction. On the other hand, a number who have looked into the matter are of the opinion that no great drop in prices may be anticipated for the present. Reporting from Omaha, city engineer John A. Bruce, says "I am convinced that only slight reductions in prices can be expected in the next few years." The U. S. Department of Labor, while it does not deny that road materials and labor costs are high, states positively that "indications are that prices will remain high for some time to come, and, in view of the forecasts for market conditions, it is imprudent to longer hold up construction anticipating

lower construction costs." A great many of the projects for road construction are more or less pressing, and if they are not carried out until 1920, cities or other communities may suffer therefrom a loss both in destruction of the road and hindrance to traffic that will more than equal the amount that might be saved by delaying construction.

There is another reason for deciding at once to go ahead with at least a normal amount of work this year. C. M. Talbert, director of streets and sewers of St. Louis, refers to this when he says: "We feel that we should place on the market at the earliest possible moment a sufficient amount of work to justify contractors in organizing their forces for a full season's work and material men in opening up their plants on the same basis." A large number of contractors who make a business of constructing public works, and who ordinarily count upon sufficient work of this kind to give full employment to their plant and warrant them in engaging foremen and making arrangement for laborers at the beginning of the season, this year are uncertain as yet whether sufficient public work will be forthcoming to warrant such action. In the case of brick plants, quarries, sand and gravel pits, etc., the operators also are in the same dilemma. When the construction season begins, the products of these plants are demanded in large quantities for immediate delivery, and they must therefore begin work long before the season opens in order to have on hand a stock of material to meet such demands. If, however, there is a general feeling that there will be little work calling for materials which they produce, they will naturally hesitate about starting up plants which have been closed down, until there is some assurance of finding a market for their output. Early decision on a public works program is always desirable, but is more so this year than ever because of this uncertainty that seem to pervade every line of business. As just stated, contractors and manufacturers of building materials would ordinarily take it for granted that there would be a normal demand for their goods in the spring and would act accordingly; but this year they are uncertain whether such demand will materialize, and municipalities should do all they can to give them early notice that it will.

If manufacturers do not receive early and definite assurance that it will pay them to turn out a stock of building supplies for this year's consumption, and work starting up in the spring should find a scarcity of such supplies, the natural tendency would be for prices to increase rather than decrease. In other words, the best way to insure such lowering of prices as it is possible to obtain, is to encourage manufacturers to open up their plants at once and begin to prepare for a more than normal demand for their output.

A number of engineers, writing to us concerning the prospects of paving work for this year, have expressed the fear that an increase of a third in freight rates on sand and gravel would greatly deter many cities from carrying out public works that would otherwise be put through. This applies especially to the cities in the middle and far west, and in Indiana and Illinois state officials have taken up the matter. Under date of February 11th, we were informed by the Department of Labor that "the United States Railroad Administration asserts that there is to be no general 30 per cent advance on freight rates for sand, gravel, crushed stone and slag. The rumor that such advances were contemplated was arousing anxiety in the central west. There is no foundation for the report that the Railroad Administration has given or is giving any consideration to any increase in present basis of rates."

We have referred several times to the obligation the country is under to furnish work for the unemployed

and the duty of cities to shoulder their share of this obligation. It is hardly to be expected that private industries will carry out undertakings for the sole purpose of furnishing work for the unemployed. Business is essentially and necessarily performed in order to make a profit; public works, on the other hand, are under no such compulsion, but the only penalty involved in high prices paid in connection with them is a corresponding increase in the tax rate. If, therefore, any work is to be carried on for the chief purpose of furnishing employment, it must very largely be in the nature of public work.

To sum up:

The cities and states of the country need at least \$200,000,000 worth of street and road paving this year. Great numbers of laborers who are being discharged from the army or from factories engaged in war work need the wages that this expenditure would furnish, both directly, and indirectly by furnishing work for cement and brick plants, quarries, etc., thus stimulating these lines of industry. We have every confidence that a very considerable proportion, if not the whole of this work, will be done this year. If it is to be done, the sooner the decision can be reached and preparations put under way, plants started up, laborers employed and other preliminaries begun, the better it will be for all concerned.

WOOD BLOCK PAVEMENTS AT LAKEWOOD.

Method Employed in Laying Block on Pitch Cushion—Joints Filled With Pitch to One-Third Their Depth.

BY E. A. FISHER.*

There is being constructed in Lakewood, Ohio, a creosoted wood block pavement on a pitch cushion. This newer type of wood block paving was adopted to remove the difficulties experienced in buckling, bleeding, shifting of cushion and crowding curbs out of alignment.

The pavement is one mile long and part of a three-mile improvement being constructed jointly between the county of Cuyahoga and the city of Lakewood on Detroit avenue, a main thoroughfare from the city of Cleveland extending through the city of Lakewood into the truck farming districts to the west. It receives heavy traffic from trucking of farm products, local trucking of building materials and supplies of various kinds for commerce. It is also subject to heavy traffic for through trucking east and west of Cleveland.

The original pavement in this street was sheet asphalt, two-inch top, one-inch binder on four inches of concrete base and served the city for seventeen years. Due to underground construction of half a dozen varieties, the original pavement was badly cut up and this together with the increased heavy traffic rendered the pavement nearly impassable.

The pavement is 42 feet wide and contains a double line of street railway tracks. At those places where the track is out of repair, a concrete header 9 in. by 24 in. integral with base is constructed at the ends of the ties. The top of the header, flush with the surface of the street, is 6 in. wide and faced with a wearing surface of 2 in. of granite concrete. At points where the tracks are in good condition, the pavement is brought to the rail, but in all cases the header curb is retained below the concrete base, thus separating the street car construction from the pavement.

The pavement base is of cement concrete 8 inches thick, laid upon a sandy soil. Old trenches are bridged with steel bars to prevent future settlement of the foundation. The base mixture used is 1:2½:5, the material

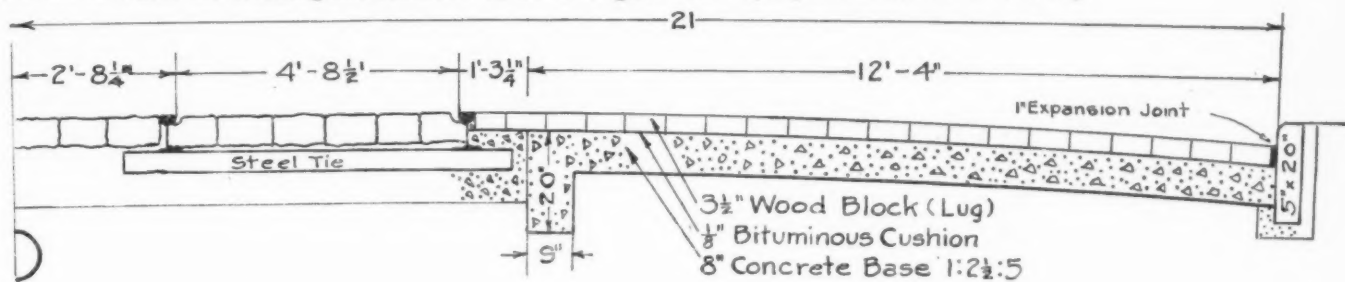
* City Engineer of Lakewood, Ohio.

graded to furnish an excess of mortar. The top of the base is brought to the proper contour by use of a template and then rolled with a roller 9 inches in diameter, 6 feet long and weighing about 50 pounds. The rolling is done transversely of the street, overlapping half the width of the roller each time, and this is continued until the surplus water is rolled out of the surface and the mortar is flushed up, leaving a surface free from short waves. There is a tendency of the roller to pick up the mortar somewhat, leaving slight corrugations which are smoothed out lightly with a long-handled float.

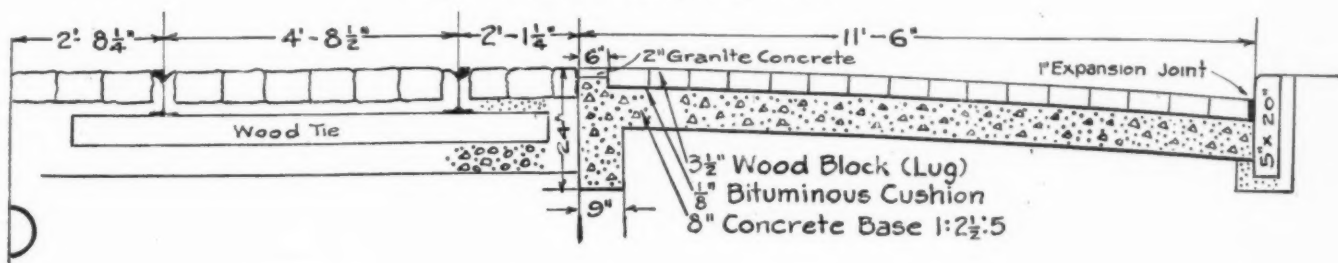
After the concrete has cured and set for the specified time and while it is dry, it is very carefully broomed to free it from dust. The work was started late last fall and the use of water for cleaning the surface was not thought

horses, reducing the slipperiness, and to provide sufficient space to insure that the filler penetrates the full depth of the joint.

When the blocks have been set, culled and rolled, the pitch filler is applied by means of buckets and squeegees. At the first pouring the joint is filled flush full and squeezed and after settlement there remains in the bottom of the joints very uniformly one inch of pitch. The remaining space is filled with sharp sand and a surplus of one inch spread over the paving to be ground into the joints and the surface of the blocks by traffic. The surplus will subsequently be removed. Care must be taken that the sand does not contain coarse particles which will enter the joint and bridge from block to block, thus destroying the function of the lug.



NEW TRACK CONSTRUCTION



OLD TRACK CONSTRUCTION

PAVEMENTS ALONG TRACKS IN LAKEWOOD, OHIO.

feasible because the concrete would not dry rapidly enough. Any carelessness in the matter of clean sweeping that results in leaving dust on the base prevents the adherence of the pitch coat to the concrete.

Following the brooming, the pitch coat is applied by means of buckets and squeegees to the depth of one-eighth inch, care being taken not to overlap and produce uneven thickness of cushion. The melting point of the pitch is between 140 and 150 degrees F. It is applied at a temperature of 250 to 300 degrees F., depending on the dryness of the concrete and the weather conditions.

After the pitch has hardened and within 30 minutes after applying, the creosoted wood blocks are laid at right angles to the curb. They are culled and then rolled with a 5-ton tandem roller longitudinally and transversely, thus setting the block firmly into the pitch cushion and sealing the bottom of the block against moisture. A one-inch pre-molded asphalt strip is placed in the gutter to provide for expansion.

The block used is "Kreolite" lug block, 3 1/2 inches in depth, treated with 16 pounds of creosote oil per cubic foot. The lugs on these blocks are three-sixteenths inch high, integral with the block, two on one side and one on one end. Since the lug, under expansion of the pavement, either crushes into the side of the next block or is itself crushed, it furnishes means of taking up expansion to prevent buckling and excessive bleeding. It also separates the block to provide foot-hold for toe caulks of

The melting point of the pitch for joints is 140 to 150 degrees F. and it is poured at a temperature of 250 to 350 degrees F. The writer believes that the higher temperature is preferable, say from 325 to 350 degrees F. or higher if the nature of the pitch will allow, since that temperature is necessary to permit removing the surplus pitch from the top of the block, leaving the top clean and avoiding waste. Any surplus left is sure to result in a gummy, disagreeable surface. A properly pitched lug-block street should never give subsequent trouble in the matter of bleeding and much of the so-called bleeding in pitch-filled streets is the result of carelessness in the matter of temperatures of the joint filler, surplus pitch on the surface, and of filling the joint too full. One third of the depth of the block is sufficient pitch in the joint to waterproof the sides of the block, which, with the seal coat, prevents the ingress of moisture at a point where the most damage is done.

It is quite likely that this newer type of creosoted wood block pavement, properly constructed, will eliminate the troubles heretofore experienced with this kind of paving material. In places where the writer has seen it under construction and later in actual service, there is plenty of evidence that it is superior to pavements laid under the older methods.

The work in Lakewood under the present contract is being done by Baldwin Bros., contractors, under the supervision of W. A. Stinchcomb, county engineer.

The WEEK'S NEWS

Pennsylvania to Go Ahead on Highways—Federal Aid Results—Portland, Ore., City Paving Plant Saves Money—Experimental Highway for Oregon—Indiana to Test Gas Heating Value—Fires in New York and Savannah—Boston Judge Blames "Public" for Molasses Tank Disaster—Mayor of Seattle Breaks "Revolution"—Minneapolis Considers Service-at-Cost Plan for Railways.

ROADS AND PAVEMENTS

Pennsylvania to Begin Work.

Harrisburg, Pa.—Governor Sproul is getting ready to make "the dirt fly" on the \$50,000,000 road plan which was approved by the voters at the last election. Attorney General Schaffer has completed legislation necessary to carry into effect provisions of the constitutional amendment, authorizing a bond issue of \$50,000,000 for road construction and improvement. The governor says that in his opinion the present legislature should prepare to authorize an issue of from \$15,000,000 to \$25,000,000 of bonds for an immediate start on his road program. The next legislature could take up the work from that point. "Now is the time to make the dirt fly," says the governor, "and it is going to fly. Some people believe this is not the proper time to start the road program, because wages are high and labor scarce. I do not agree with this view. By going into the market the state can aid in settling economic problems and can stabilize conditions. The expenditure of a few millions of dollars stimulates industry. Whatever we do with the \$50,000,000 we will do it well. The road program is a great undertaking, and must be handled in a broad way. There are many men who can be employed on road work, not alone laborers, but skilled men who have been in service abroad in the engineering and other units, and who undoubtedly would be glad to find service with the state." The state will shortly take to the abandoned roadbed built by the Delaware, Lackawanna & Western Railroad from Scranton to Binghamton, N. Y., and as soon as this is done a start will be made upon improving the road, which is known as the Lackawanna trail. "This will make a splendid start on the road program," said the governor. "The company offered the road bed to the state two years ago, but it was not accepted. Now we are prepared to take title. We also intend to get busy as soon as the weather settles on improving the 40-mile stretch of road across Erie County in the 'stovepipe' region." The governor said he was continually hearing ill reports about this section.

Work of Federal Aid.

Washington, D. C.—From the passage of the federal aid road act, July 11, 1916, to December 15, 755 projects were approved by the Secretary of Agriculture, according to figures announced by the National Automobile Chamber of Commerce. These projects involve the improvement of 7,867 miles of public roads, at a total estimated cost of \$57,632,000, of which the federal government has been requested to contribute \$21,602,000. There have been actually completed to date twelve projects, involving a total of fifty-one miles of road, costing approximately \$617,548, and on which federal aid in the amount of \$260,660.19 was paid. Altogether there are more than 7,500 miles of road for which most of the steps preliminary to construction have been taken, so far as the bureau of public roads is concerned. Numerous other projects not yet reported to the department have been completed or are under construction, so that the sum total of the road work now in progress under federal aid is greater than appears in this summary. In the New England states, Connecticut, Massachusetts, Rhode Island, Vermont and New Hampshire have been interested in closing up short gaps on their main

highways which are otherwise improved for the entire distances. The same condition has been true in New York, where the numerous projects are all short and undertaken with a view to linking up an extensive network of roads which are already hard-surfaced. In Pennsylvania the only long project was on the William Penn highway, where construction is under way for a distance of thirty-three miles through Dauphin, Lebanon and Berks counties, at a cost of \$938,000. In Maine federal aid has been concentrated on the main post road through Portland, south through Augusta and through New Hampshire into Massachusetts. One of the features of the year's work will be the improvement of the Dixie highway, which will be done by the states acting in co-operation with the government. Thus, in Illinois, the highway will be improved from the county line north through Will, Kankakee and Iroquois counties to the Vermillion County line running south. This work will extend over a distance of 54.5 miles, at a cost of \$904,700, and the construction will be of concrete and bituminous macadam. In a like manner a great deal of work will be done on what the West calls the Interstate Military highway, the line of which runs from Canada on the north to the Gulf of Mexico on the south. Seventy miles of improved road will be constructed on this highway in Colorado. The Colorado project will be joined by two projects in New Mexico, which run from Raton Pass south for a distance of 84.5 miles. The three projects taken in conjunction will mean an improvement of a continuous stretch of the highway of 161.5 miles, at a cost of more than half a million dollars. In the South, Florida is interested principally in the construction of bridges on the road from Pensacola to Jacksonville via Tallahassee, which is the old Spanish trail.

Municipal Paving Plant Saves Money.

Portland, Ore.—Through the operation of the municipal paving plant during the past seven months there has been saved to the taxpayers of Portland \$27,501, the difference between what the work performed by the plant actually cost and what it would have cost had the work been performed by private contract under prevailing contract prices, according to commissioner A. L. Barbur, of the department of public works, in a detailed report of the operation of the plant since it was installed. In his report commissioner Barbur attempts to prove that new construction and repairs to pavements can be made by the municipally owned plant for nearly one-half what the same work would cost under private contract. In the construction of new pavements he says that the plant has saved the taxpayers \$22,781; maintenance work \$3,376 and repair of utility cuts \$1,343. As the establishment of the plant cost only \$8,000 and has been in operation only seven months the showing made is cited as sufficient justification for the installation of the plant. In discussing the work performed commissioner Barbur in his report said: "The production of paving material at low cost was aided by two other factors—the first that an annual contract was made for sand and gravel at pre-war rates before the market was raised by war exigencies, and the second by the substitution of crushed gravel for crushed rock in the paving mixture. The last mentioned change, which has been tried with success in other cities, reduced the cost of the paving aggregate

to a considerable amount, as the cost of the gravel has been less than one-half of that of crushed rock. On the other hand, the war has been responsible for several factors which have tended to increase the cost of pavement production. Wages of the plant and street crews have been at least 33 per cent. higher, while the cost of asphaltic cement has been at least 100 per cent. higher than before the plant began operation. In the main, however, the factors which have tended to increase the cost of paving production have heavily overbalanced those tending toward reduction. Nevertheless, the results obtained with the plant have absolutely demonstrated that the prices charged for paving under the contract system now in vogue for street improvement is and has been far in excess of the actual cost for such work.

For instance, during the summer 1.51 miles of Terwilliger boulevard, our West side park drive, was surfaced with a two-inch wearing surface of asphaltic concrete by means of the municipal plant. The contractor's estimate for laying the two-inch top of asphaltic concrete was \$1.43 per square yard, exclusive of the cost of grading and scarifying the macadam foundation to a proper subgrade. The Terwilliger boulevard work was completed at a total unit cost of \$0.693 per square yard, which included not only the laying of the two-inch asphaltic concrete top, but also all the scarifying and grading work, as well as the crushed rock used in rounding out the foundation. On this one piece of work alone, containing 22,464 square yards of pavement, there was a saving to the city as against the contractors' prices of \$18,150.91, or nearly enough to pay the entire cost of two municipal paving plants like our own.

The city has realized a considerable saving in the matter of maintenance work during the past seven months, as 2,355.6 square yards of pavement were patched or replaced at an average cost of \$1.44 per square yard instead of the average charge of \$2.87 formerly paid for similar work under the contractors' schedule.

In the matter of the repair of cuts made by utility companies, it was determined during the past year to maintain the charges made by the city for such repairs at the same rate formerly maintained under the contractors' schedule, as it would be certain that such charges would be sufficiently high to protect the city against loss.

The paving plant has repaired 2,325.6 square yards of utility cuts during the past seven months at a charge under the contractors' schedule of \$7,113.27, while the actual cost of the work was \$5,769.29, or \$1,343.98 less than the charge made, proving conclusively that the contractors' schedule is amply high and safe.

In addition to paving the Terwilliger boulevard, the paving repair plant has improved Nicolai street at a saving to the taxpayers of \$914, Clifton street at a saving of \$321, Mulberry street at a saving of \$330, paving on bridges has been laid at a saving of \$62.27, and crosswalks have been laid at a saving of \$3,001.

Legislature Approves Experimental Highway.

Salem, Ore.—The house has passed Bean's experimental paving bill by unanimous vote. The measure directs the state highway commission to lay fifteen miles of continuous paving on the Pacific highway, five miles of which is to be of bituminous material, five miles of concrete and five miles of wood block. The purpose is to test the respective values of the different types of pavement.

WATER SUPPLY

New Water Works Addition Approaching Completion.

Wilmington, N. C.—The addition to the city waterworks plant, authorized several months ago, will be completed by the beginning of April, and when complete will give the city a daily water supply of more than 6,000,000 gallons of pure water. Work is being pushed rapidly on the construction of the additions to the plant. The work is being done under the direct supervision of J. L. McGehee, who comes to Wilmington from Quantico, Va., where he was engaged in Government construction work. The plans for the additional equipment were drawn by J. Newton Johnson, city engineer, who is watching the development closely. Capt. John H. Sweeney, in charge of the works, who has been out there since the first gallon of water was pumped in 1881, is also following the work. The capacity of the present plant will be increased 50 per cent by the addition of new pumping machinery, new filters and new settling basins. Excavation for the new basin is about complete, and the building of the reinforced concrete walls of the basin will begin within the next week.

All the material required is in hand. The basin will be 150 feet long and 60 feet wide, having a capacity of 1,000,000 gallons. It is being built just beyond the present reservoir. When the additions are complete, the present intakes through which is pumped the raw water from the Northeast river will be abandoned, and water will be taken from the Cape Fear river two miles away. To do this will require 11,000 feet of 24-inch pipe, laid under the bed of the Northeast branch below the probable depth of any dredging operations that may be undertaken later. The main will be laid about 30 feet below the high tide level. The reason for changing from the present source of water is the fact that the water in the main river is cleaner and fresher. It comes from a source some 200 miles up the state and is not polluted by sewage. The Northeast branch is mostly "black water" from the harbor here and is heavily contaminated. It is estimated that by using the cleaner water from the Northwest branch a saving of \$20 per day can be made on chemicals, or more than enough to pay the interest on the bonds required to finance the extension and development of the plant. The Northeast branch is only a few miles in length and is fed by creeks that run from swamps and the water is charged with vegetable matter and coloring. The new source of intake is above the reach of the ordinary flow of water from the harbor on the flood tide and the only matter in the water is silt and a small application of alum will be sufficient to cleanse it from all impurities. The improvements at the waterworks will cost the city about \$55,000 when complete.

Water Bill Increase to Be Refunded.

Charleston, W. Va.—Charleston and suburban householders who have paid the twenty per cent increase on their December water bills on account of the allowance of such an increase granted the West Virginia Water & Electric Co., in November, by the state public service commission, will get it refunded when they come to pay their January bills, or the bills for the first quarter of the year 1919. Those who refused to pay the increase will not now have to pay it for that one month. An order to this effect has been entered by the commission. In entering the order it was explained by the commission that it was not the purpose of the commission to have the 20 per cent increase become effective until January, but that the water company under the mistaken impression that the allowance was operative in December, charged up the increase for that month to those paying by the month, or that portion of it on the quarterly bills of those paying by the quarter. The order provides that the refunder ordered shall be credited on the January bills as a deduction. In entering the order, the commission takes occasion to call attention to the practice of the West Virginia Water & Electric Co. of "by-passing" water to consumers during the progress of repairs and improvements at the water plant and on occasions when large quantities of water were required by local industries and the United States ordnance plants, and directs that such practice be discontinued, even if the supply has to be cut short at those plants in order to supply domestic consumers with water not "by-passed." In the event that it becomes absolutely necessary to "by-pass" water, the commission requires that it be officially notified by the management of the water works.

STREET LIGHTING AND POWER

State Survey of Heat Value of Gas.

Indianapolis, Ind.—The gas heat standard committee formed at the suggestion of the Indiana public service commission, last October, to make a survey of artificial gas plants in Indiana and then to recommend to the commission a standard heat value for gas sold under commission regulation in Indiana, has begun on the first of a series of working tests in four typical gas plants in the state. Progress is being observed with a great deal of interest by middle west gas manufacturers, state commissions, city officials and also by the United States Bureau of Standards.

The federal bureau is co-operating also. The plant of the United Gas and Electric Company at New Albany was the scene of the first test. Tests at the plant of the Northern Indiana Gas and Electric Company at Crawfordsville, the plant of the Huntington Light and Fuel Company at Huntington and at the plant of the N. I. G. & E. at Ft. Wayne will follow. The results of the tests, with data already in the hands of the committee, will then be used to formulate a report to the commission on the proper number of British thermal units to be produced by artificial gas. The commission is not obliged to adopt the standard advised by the committee, but when it makes its own decision from the data submitted, it will adopt a standard which is to serve as the basis of regulation of rates and service. Cities will be free to require whatever number of heat units they may desire, but the commission will have a standard to go by as to rates and service. The present standard is 600 B. t. u. per cubic foot. When wartime operating conditions made it difficult for gas companies to produce 600 B. t. u. gas in Indiana they began clamoring for a reduction of the required number of heat units, with the result that the commission called a conference on the subject. Out of the conference evolved the committee. It is composed of H. C. Pfeffer, professor of chemical engineering, Purdue university, for the Indiana Municipal League; J. B. Klumpp, gas engineer for the United Gas Improvement Company, for the Indiana Gas Association; A. I. Phillips, associate gas engineer for the United States bureau of standards, and H. O. Garman, chief engineer for the Indiana public service commission. Each member of the committee, with the exception of Mr. Klumpp, is on the testing committee with A. B. Abbott and A. B. Frankie, staff assistants of the federal bureau; Frank Hiss, plant engineer at the Lafayette gas works; D. W. Hufford, J. T. Hallett and F. W. Bostel, of the commission's engineering staff; Charles O. Bond, chief of the Philadelphia laboratories of the U. G. I. Co. When the commission adopts a standard it is expected that it will base gas prices on the standard and then require gas companies to bill consumers in accordance with the actual degree of compliance with the standard so that if, for instance, gas is to be sold at 60 cents a 1,000 cubic feet for 580 B. t. u. quality and the quality of the gas falls to but 550 B. t. u. the bill will be reduced proportionately.

Would Mortgage One Utility to Purchase Another.

Madison, Wis.—Senator Zumach has introduced a bill which would authorize cities of certain classes to mortgage municipally owned plants and to purchase, establish or complete additional ones, with the proceeds of such mortgage. This bill marks a renewal of the attempt to make it easier for cities such as Madison to acquire, own and operate public utilities. The bill is really what Milwaukee socialists have long been advocating, namely, the mortgaging of the city water works to obtain money necessary to buy the street railway system now operated and owned by the Milwaukee Electric Railway and Light company. While it is not possible for Milwaukee to be named specifically, the bill obviously is aimed at that city. Previous attempts have been made to pass such a bill in the legislature. It is believed there is a good chance now of the bill becoming a law. Cities like Madison, it is said, would welcome such a law. The city owns the water works and advocates of municipal ownership of public utilities here have long stressed the possibility of mortgaging the city water plant to gain control of the Madison street railway company lines. The bill provides that any city of the first, second or third class, however incorporated, which owns or may hereafter own water works, electric lighting plant, gas plant or other public service institution, shall have the right to mortgage the water works or other public service institution to raise money to buy, establish or complete any other public service institution, on compliance with that part of the proposed law which says a majority vote of the city council shall constitute sufficient authority to put the matter up to the citizens at a special election. In case the city is not able by mortgaging the

plant already owned to raise enough cash funds, the bill allows the city to use cash funds on hand to complete the purchase and then immediately to mortgage the newly acquired property to replace funds used. In Milwaukee there has been consistent opposition to this so-called socialist plan. Now, under present conditions, and with the street railway company trouble, it is felt that the bill will meet with little opposition there. Emergency measures, such as the construction of large public works and the subsequent opportunity for employment of more people, will be more feasible under this proposed law, it is said. Assemblyman John S. Kaney, of Milwaukee, has introduced a resolution, also pertaining to municipal ownership, which proposes a change in the constitution to permit cities to purchase public utilities without charging the cost to their limited indebtedness.

Survey of State-Owned Power Equipment.

Richmond, Va.—Governor Davis, in line with his economy and efficiency program, has announced the appointment of a Governor's Board of Mechanical Survey for the purpose of making careful study of the power plants, heating systems, and other mechanical equipment at the several state institutions, including the heating and lighting systems, the elevators and water system at the capitol. The following engineers were named members of the new board: Edward J. Willis, consulting engineer and inventor, Richmond; Charles Hancock, professor of mechanical engineering, University of Virginia, Charlottesville; J. C. Dickerman, engineer, State Corporation Commission, Richmond; Col. Thomas A. Jones, professor of civil engineering, Virginia Military Institute, Lexington; Col. J. S. A. Johnson, professor of applied mechanical and experimental engineering, Virginia Polytechnic Institute, Blacksburg. In announcing the appointment of this board, Governor Davis stated that as a result of his personal inspection of state institutions since his inauguration he is convinced that a good many thousands of dollars are wasted annually because of deficient and inadequate mechanical equipment and poor installation on the one hand, and through inefficient and faulty methods of operating the plants on the other. Large annual waste of coal results, for instance, he said, from present methods of firing in the power plants at a number of the state institutions. At some institutions, he thought, the furnaces and the boilers are antiquated and are costing the state more to operate them annually than it would cost to replace them with improved efficient and up-to-date equipment which would materially lower the cost of operation and furnish the required power, heat and light which many of the existing plants are unable to do. It is understood that the actual field work will be gotten under way by the early spring, and will be chiefly done during the summer months, so that its recommendations can be in the hands of the governor in time to place before the general assembly, next January.

FIRE AND POLICE

Fireman Killed in Blaze on Transport.

New York, N. Y.—One fireman was killed and several others had narrow escapes while fighting a fire in the hold of the steamship K. I. Luckenback, in the Naval Transport Service, docked at Pier 1, Bush Terminal, Brooklyn. Besides the firemen who suffered, several sailors and a military policeman dropped while battling through dense smoke in a desperate attempt to confine the blaze to the hold where it started and to recover the body of Alfred Kundie of Truck No. 114, who lost his life when, overcome by fumes, he fell down a hatchway into the hold. The damage to the ship was estimated at \$100,000 and the fire was reported under control at midnight, after it had burned the hold where it started, which was filled with hay, candy and oats. When the fire was discovered the Bush Terminal fire department responded to a private alarm and

started pouring water down the hatch. Meantime a city alarm was turned in, and battalion chief Langan responded with the first quota of apparatus. By then the blaze threatened to spread to the adjacent compartment, where thousands of gallons of gasoline and crude oil were stored. Members of the Naval Reserve aided the Bush Terminal men in trying to smother the blaze. Langan sent in a second alarm, and a call for the fireboat William J. Gaynor. Meantime, Kundie, with others, had mounted a ladder on the third deck and was directing a stream into the hatchway. A sudden belch of smoke rendered him unconscious and he toppled straight into the hold, striking his head on a beam as he fell. Langan and several of his men raced below and fought desperately to rescue him. Langan himself dropped unconscious to the deck and several of his aids fell about him. With the help of the fireboat, the flames were driven back from the entrance to the hold, and firemen were able to recover the body of Kundie. After several hours the fire was practically extinguished without having reached the gasoline and oil.

"Public" Blamed for Molasses Tank Explosion.

Boston, Mass.—"The chief blame rests upon the public itself. This simple accident has cost more in material damage alone than all the supposed economies in the building department. Laws are cheap of passage, costly of enforcement. They do not execute themselves." This statement is part of the finding of chief justice Bolster of the municipal court in the recent inquest on one of the nineteen victims of the recent disastrous explosion of a big molasses tank. The judge ordered processes against the United States Industrial Alcohol Company, owners of the tank, for violation of the law. The builders of the tank would be proceeded against in the same way if they could be reached, said the judge. The judge's statement continues: "A public which, with one eye on its tax rate, provides itself with an administrative equipment fifty per cent qualified, has no right to complain that it does not get a hundred per cent product, and so long as it accepts political influence as the equivalent of scientific attainment in a high degree, so long it must expect breakdowns in its machinery. It is no part of the business of this court to find a scapegoat to order for an indifferent or niggardly public, on the demand of the inevitable prophet after the event. The only assignable crime involved is manslaughter, through negligence. But error of judgment is not negligence, and if the public is content to buy a mere draftsman for a position demanding a high degree of technical training and skill, it can hardly complain that he is negligent in not exercising a skill which he confessedly does not have, and in view of his compensation cannot be expected to have. The men who failed are entitled to be judged according to their lights. However, as the jurisdiction of this crime lies with the Superior Court, and as a grand jury may view the matter differently, I submit this report for their consideration. In view of the fact that other containers similar to this now exist, which may have been erected with no greater scrutiny, their efficiency should be immediately and adequately examined before this accident is duplicated. There should be an inquiry into the advisability of permitting lap-joints in structures and equipment subjected to high tension. The requirement of the Building Department, if not the law itself, should be made such that it will not be possible for a license to issue without such full information as to structural details as will expose rather than conceal points of special risk." As showing the inefficiency of the building department, the judge recites the preliminaries to construction of the tank:

"The total capacity of the tank was 2,379,000 gallons. In 1914 the Purity Distilling Company, through Arthur P. Jell, its treasurer, solicited a non-competitive bid for the steel work from the Hammond Iron Works, which had built for the distilling company smaller tanks in Cambridge, and in connection with which Jell had told the iron company that the weight of molasses was 11½ pounds per gallon, and that his company counted on a factor of safety of three.

Jell testified that this latter was not because of any expert knowledge or advice, but because he had had knowledge of bids for like work figured on a factor of safety of two, and desired to have it safe. Details of construction were left to the iron company.

"On Sept. 30, 1915, C. H. Gannett, an architect, filed on behalf of the distilling company in the office of the building department of Boston an application for a license to build the tank and foundation. Gannett testified in effect that he accepted the plans for steel construction at their face value and did not look into their sufficiency. It did not appear that he was hired to do other than plan the foundation. It will be noted that the application is not sworn to, as the statute permits, and that the name of the proposed mechanic is left blank.

"The distilling company informed the Hammond Company that it had learned it could work under the general license which, in fact, was issued to George H. Guyette, a carpenter in the employ of the Hugh Nawn Company, who, on his own testimony, was not competent to supervise the steel construction, and did not, in fact, supervise it in the slightest degree. In so far as the building laws contemplate the issue of a license to a person competent to do work, who shall actually do or superintend it, that purpose failed here. If such practice still obtains it should be stopped as applied to such cases as this.

"The application was accompanied by blue print plans without further specifications than are shown on the plans and which, so far as concerns critical points in the steel structure, are wholly inadequate in point of any information sufficient to show the structural factor of safety. The then commissioner, Patrick O'Hearn, testified that they were never brought to his attention.

"Apparently they followed the office routine, which was that after being looked over 'in a general way' by the desk clerk they were put in a drawer to be taken for examination in their turn by one of the three plan examiners.

"Finneran, to whom they fell, testified that so far as concerns the steel structure he passed them as adequate, assuming them to be so because the application and plans bore the name of a civil engineer. Evidently the problem, an unusual one, was beyond him.

"Carl Stuetzel, Jr., chief of the plan division, testified in effect that he must have entered his approval on the strength of Finneran's stamp and the fact that the papers came from a civil engineer. Carroll, the inspector of construction, competent as to concrete foundation, took the steel plans as adequate because a license had issued and made no supervision of the actual steel construction, being, as he admitted, not qualified to do so.

"In short, these steel plans passed through a department created for the primary purpose of safeguarding life without any checking up of the all-essential matter of structural sufficiency. So far as that department is concerned the plans licensed themselves. The only excuses offered were extreme rush of business in an under-manned department, which is probably true, and that such a tank was not a building or structure within the meaning of this law. The latter plea will hardly serve, considering that the department in fact took jurisdiction. But I am clear that the tank was a structure within both the letter and spirit of the law. In justice to the present department, it should be kept in mind that this occurred in 1915. Whether the present department is more or less efficient is not involved in this inquiry. The tank was built, formally accepted by the distilling company on Feb. 1, 1916, and put in service." Through the co-operation of the police much of the shell surrounding critical points has been reassembled and been tested by the Charlestown Navy Yard metallurgical department. The judge finds that:

"Molasses will generate by fermentation a very considerable amount of carbon dioxide gas, over 200 times its own volume. While this would ordinarily escape through the goose neck in the top, it is likely the large mass of colder, viscous molasses, which was in the tank before the January fill, may have acted as a tamping agent to confine some of the gases generated in the warmer layer pumped in from the bottom, causing enough additional pressure to furnish the proverbial 'last straw,' which seems to me the most plausible explanation of the fact that the tank stood up for forty-eight hours after the completion of its last filling. For this molasses was evidently in process of fermentation.

"Even, however, assuming the liquid charged with this gas to the point of saturation, on the lower strata, the comparative ease of its escape to the top seems to negative the idea that such conditions could have burst the tank, given a proper container.

"My conclusion from all this evidence is that this tank was wholly insufficient in point of structural strength to handle its load, insufficient to meet either legal or engineering requirements.

"I am satisfied that the adequate and predominating cause of this accident was a bursting from internal pressure exceeding its structural strength, and I so find."

Savannah Terminals Swept By Fire.

Savannah, Ga.—Fed by large quantities of resin and turpentine, fire destroyed the plant of the Southern Fertilizer and Chemical Company here and burned a swath three city blocks long and about 200 feet wide through the terminals of the Seaboard Air Line Railroad on Hutchinson Island with a loss estimated at millions of dollars. Cotton, naval stores, sugar, lumber, and nitrate of soda added to the intensity of the flames, which were controlled after five

hours of fighting by the combined forces of the railroad company and the city, aided by fire tugs. The efforts of the firemen were hindered by a thick, suffocating smoke arising from the burning resin and turpentine, and by a wind which was almost a gale. Explosions which for nearly half an hour were heard in rapid succession through the city were said to come from the flames breaking into the nitrate of soda. The fire, the origin of which has not been determined, was discovered in the railroad terminal at 3 o'clock in the afternoon and quickly spread to the fertilizer plant. It was brought under control at 8 o'clock. With the fertilizer plant more than thirty loaded freight cars were destroyed. The nitrate of soda burned was valued at \$1,500,000. The terminal is across the Savannah River from the business section of the city.

GOVERNMENT AND FINANCE

City to Appeal in Case of Records.

San Francisco, Cal.—Robert M. Searls, special counsel for the city, has announced that an appeal will be taken from the decision of superior judge George E. Crothers declaring that the bureau had a right to see the Hetch-Hetchy data. In the absence of city engineer O'Shaughnessy, who is in the East, the bureau had not moved to take advantage of the Crothers decision. It had, however, according to manager Paul Eiel, determined to bring to San Francisco a hydraulic engineer of such standing that what he said about the Hetch-Hetchy dam site after he had gone over the records of diamond drill borings that O'Shaughnessy refused to throw open to the public would carry great weight in the community. But Searls' announcement now makes it appear that the municipal administration is still determined not to let the public know about the situation. However, the board of works is expected to advertise for bids for the construction of the Hetch-Hetchy dam in about a month. The disputed records will have to be made, it is said, a part of the specifications.

Woman Wants to Be Chicago Mayor.

Chicago, Ill.—Mrs. Leonora Z. Meder, a lawyer, club-woman, and former city commission of public welfare, announced her candidacy for mayor. In making the declaration of her intentions, Mrs. Meder said: "There is no reason why a woman cannot govern the second largest city in the United States. Can you name one of the candidates who has thrown his hat into the ring who is better qualified than I?"

Seattle Mayor Suppresses a "Revolution."

Seattle, Wash.—A complete shutdown of the normal activities of the city, including most of the industries, newspapers, street cars, restaurants, schools, etc., which took on the aspects of a rebellion against constituted authority, has been practically ended. The general strike failed because of the withdrawal of the more conservative unions. The men on the municipal street car lines went out and the mayor inaugurated a municipal jitney service. Some of the engineers of the municipal light plant, who struck, were replaced by non-union men by superintendent Ross. The strikers opened union "soup kitchens" for feeding their members and dependents. Mayor Ole Hanson issued an ultimatum to the strikers, in which he threatened to "take steps to operate all essential industries and place this city under control of the Federal Government." In a proclamation to the people, he said: "By virtue of the authority vested in me as mayor, I hereby guarantee to all people of Seattle absolute and complete protection. They should go about their daily work and business in perfect security. We have 1,500 police officers, 1,500 regulars from Camp Lewis, and can and will get the services, if necessary, of every soldier in the Pacific Northwest, to protect life, business, and property. The time has come for every person in Seattle to show his Americanism. Go about your daily duties without fear. We will see to it that you have food, transportation, water, light, and gas, and all the necessities. The anarchists in this community shall not rule its affairs. All persons violating the laws will be dealt with

summarily." He said: "Any man who attempts to take over government functions here will be shot on sight," and "the seat of the city government is still at city hall." With the end of the strike in sight, he issued the following statement: "The general strike has failed. This means a split between decent labor and the Industrial Workers of the World. Seattle, a loyal city, has responded nobly in this emergency. The revolution has failed. The attempt to establish a Soviet Government and control and operate all enterprises and industries has collapsed. The Government should arrest, try, and punish all leaders in this conspiracy. No skim milk policy should be adopted. The city authorities have quelled this rebellion. It is now the Government's duty to punish. The whitewash brush must not be used."

TRAFFIC AND TRANSPORTATION

Subway Engineers Reinstated.

New York, N. Y.—The board of estimate has reversed its decision which recently resulted in the discharge of almost four hundred engineers engaged by the public service commission on the construction of the new subways with only a few hours' notice. This action caused strong protests from civic and business organizations and was the subject of a hearing by the engineering societies, at which the contractors and labor unions were represented. The discharge was due to the failure of the board of estimate and apportionment to appropriate a sufficient sum for their salaries and expenses for the year 1919. The board has now authorized the commission to reestablish the roll in force on Dec. 31, and an appropriation was made to maintain this organization during February and March or the remainder of the current quarter. All those discharged, most of whom were engineers, have been reengaged by the commission, with the exception of some who had taken positions elsewhere.

Service-at-Cost Plan for Minneapolis.

Minneapolis, Minn.—A draft of the proposed service-at-cost franchise for the Minneapolis Street Railway has been submitted to the committee of the city council on street railway matters by city attorney C. D. Gould and Stiles P. Jones, who were retained by the city as franchise experts. The basis of the proposal is service at cost, starting with a 5-cent fare with universal transfers plus a division of earnings between the city and the company and complete city supervision over service and extensions. The proposed franchise will be considered by the committee in a series of weekly meetings. At its last meeting the committee decided to take the C. L. Pillsbury valuation of \$24,346,113 on the company's property, and allow the company 7 per cent earnings on that valuation, instead of on the \$25,914,307 figure fixed by city engineer F. W. Cappelen. The fundamental purposes of the franchise grant, as stated by the two experts, are as follows:

To furnish the Minneapolis public with adequate railway service at all times, at a rate of fare sufficient to provide the facilities for such service, meet the legitimate costs of operation, maintain the property continuously in first-class condition and pay the company its fixed minimum return upon investment.

To provide for effective public control of service and extensions.

To provide for such public supervision of the property as will assure honest, efficient and economical management in the public interests.

To provide for an equitable division of the surplus earnings between the city and the company.

To provide for the purchase of the property by the city, and the terms, times and conditions thereof.

Some important provisions of the grant are as follows:

The company shall surrender its present franchise and waive all rights thereunder upon the taking effect of this ordinance.

The city shall have the right to purchase upon agreed valuation and subsequent additions giving one year's notice of its intention to purchase, at expiration of any five-year period.

The fare shall be 5 cents, with universal transfers; children under six years of age, free. Policemen and firemen may ride at reduced rates, as provided by the state law.

The company may adopt reasonable regulations governing the use of transfers, subject to the approval of the city council.

LEGAL NOTES

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Extra Work Contract—Authority of Engineer.

(Pa.) A provision in a contract with a city for a public improvement that the decision of the city engineer shall be final in all disputes between the parties, and that he shall determine the amount or quantity of the several kinds of work which are to be paid for and the compensation, will not prevent submission of an action to recover for extra work to the jury, where the issue as to whether the engineer acted within the authority conferred on him by the contract was involved.—*Ahrens v. City of Reading*, 104 A. 511.

Misrepresentation Made by Municipal Agent—Responsibility of Town.

(Me.) A municipality may be made responsible for misrepresentations made by its agent to induce one to enter into a contract with it.—*Prest v. Inhabitants of Town of Farmington*, 104 A. 521.

Assessment for Highway—"Original Construction."

(U.S.C.C.A.Ky.) Where a highway has been constructed by certain municipalities, and taxpayers have contributed to its cost in order to complete the improvement, the main expense having been borne through a bond issue, and not by the abutting lot owners, the construction was not an original one, under Ky. St. section 3564, so that on the passage of an ordinance to improve such highway, the cost may be imposed as for "original construction" upon abutting landowners, instead of upon taxpayers generally, under section 3565.—*Ludlow v. City of Ludlow*, 252 F. 559.

Sewer Assessment—Abutting Owner.

(Iowa.) Where sewer was constructed to commence 13 feet farther than point fixed by city council's resolution of necessity, thus making assessed owner's property abut upon it, which otherwise it would not have done, though it might still have been deemed adjacent to improvement, the council could assess the property under Code, sections 819, 920.—*Williams v. City of Cherokee*, 169 N. W. 110.

Construction of sewer beyond point fixed by resolution of city council, thus causing assessed owner's property to abut on sewer, was not prejudicial to her, unless such method was adopted to fix liability to which she otherwise would not have been subject.—*Id.*

Unopened Street—City Liability for Injuries.

(Va.) City is not required to open all its streets for public travel, and its liability for injuries to pedestrian does not attach as to street neither accepted, opened, nor improved; but, if city permits use of street as such, though without improving it, it is liable.—*City of Roanoke v. Sartini*, 96 S. E. 763.

Where land company platted street, and city graded on both sides of excavation, exercised acts of ownership, and erected street signs, pedestrians using street, though for vehicles it was impassable in part on account of excavation, city accepted street as highway, and was liable for negligence causing injuries to pedestrian.—*Id.*

A city, by mental reservation of officials, cannot segregate small section of continuous street, and avoid customary obligations to keep in proper repair, etc., the part so reserved; it must give public notice of reservation, as by erection of barrier, etc.—*Id.*

Street Improvement Assessment on Industrial Property.

(Ill.) In establishing new highways, extent of use of old and new, and probable effect upon routes of travel of new highways, should be considered in determining effect upon property.—*City of Chicago v. Farwell*, 120 N. E. 520.

In proceeding to assess upon dock and canal company part of cost of street improvement, company's proposed finding that others using streets and bridge for like pur-

poses would share advantages with occupants of objecting property was immaterial.—*Id.*

That industrial property sought to be assessed for part of cost of street improvement is not contiguous to particular street or bridge, and will not be to proposed improvement, is not material, except as to amount of benefit, and it is properly assessed if it does receive some benefit increasing market value.—*Id.*

Cost of entire street improvement was properly assessed against all property benefited, in proportion to benefit, and proper mode to find amount of benefits was not to deduct from total cost of improvement cost of acquiring land which objecting property owner claimed was unnecessary for improvement that would benefit its property to maximum.

Object of city's proceeding to assess cost of street improvement is to assess whole cost of entire improvement upon all property benefited; the fact that parts of improvement only were beneficial to certain property not freeing it from liability for its proportion of cost of other parts of improvement not beneficial to it.—*Id.*

If benefit to property from street improvement is less or greater because derived from some particular element of improvement, the fact must be considered in determining proportional amount of cost the particular property should bear.—*Id.*

City Contracts Specifying Stone Cutting in City—Lowest Bidder.

(Pa.) Ordinance of city of Philadelphia, requiring contracts for construction of public buildings to specify obligation of departments to have stone cutting done in city and that proposals shall so specify, violates Act May 23, 1874 (P. L. 230), in so far as compliance would result in award to other than lowest responsible bidder.—*Taylor v. City of Philadelphia*, 104 A. 766.

Recovery by Subcontractor on Principal's Bond.

(N.C.) A subcontractor of sewer work, on the failure of the principal to pay for work done, may recover on the principal's bond, given pursuant to Laws 1913, c. 150, as amended by Laws Ex. Sess. 1913, c. 9, and Laws 1915, c. 191, requiring a bond conditioned for the payment of all labor done; such bond covering the very work contemplated by the subcontractor, which the principal contracted with the city to furnish at his own expense.—*Schefflow v. Pierce*, 97 S. E. 167.

Damages Caused by Street Grading—Offset by Increased Values.

(Ga.App.) An increase in value resulting from improvement may be set off against damage caused by grading of streets.—*City of Savannah v. Williamson*, 97 S. E. 104.

Reconstruction of Improved Street—Assessment—"Roadway."

(Cal.App.) Under Vrooman Act, section 20, relating to street improvements, once a street has been accepted, it must thereafter be both repaired and improved by the city, so that subsequently property owners cannot be assessed for constructing therein a new kind of pavement, gutter, or curb.—*Barber Asphalt Paving Co. v. Abrahamson*, 175 P. 490.

An ordinance whereby a city accepted a roadway was not in contravention of Vrooman Act, section 20, because it excepts therefrom a portion required by law to be kept in repair by a railroad company, when read in connection with Civ. Code, section 498.—*Id.*

Under Vrooman Act, section 20, relating to street improvements, curb is to be included within the term "roadway," so that acceptance of roadway includes the curbing.—*Id.*

Where a city had no authority to lay down at the expense of property owners a new street in place of one accepted under Vrooman Act, section 20, the condition of the street at the time of the adoption or resolution of intention was immaterial to the jurisdiction of the council to order the construction of the new street.—*Id.*

NEWS OF THE SOCIETIES

Feb. 25-28, 1919.—AMERICAN ROAD BUILDERS' ASSOCIATION. Sixteenth annual convention and Ninth American Good Roads Congress under the auspices of the A. R. B. A., Hotel McAlpin, New York, N. Y. Secretary, E. L. Powers, 150 Nassau street, New York, N. Y.

March 12.—VERMONT SOCIETY OF ENGINEERS. Annual meeting, Burlington, Vt. Secretary, Geo. A. Reed.

March 25, 26.—AMERICAN WATER WORKS ASSOCIATION, ILLINOIS SECTION. Eleventh annual meeting, Urbana, Ill. Secretary, G. C. Habermeyer, acting chief, State Water Survey, Urbana.

April 14-19.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Mineral Wells, Tex. Secretary, F. A. Rountree, Birmingham, Ala.

April 25-26.—AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE. Annual meeting, Philadelphia, Pa. Secretary, J. P. Lichtenberger, Logan Hall, West Philadelphia, Pa.

Nov. 12-14, 1919.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

AMERICAN ROAD BUILDERS' ASSOCIATION.

The sixteenth annual convention of the American Road Builders' Association will be held at the Hotel McAlpin, New York City, Feb. 25 to 28. The opening session will be held on Tuesday, Feb. 25, at 10.30 a. m. The address of welcome on behalf of the state of New York will be given by Francis M. Hugo, secretary of state. The address of welcome on behalf of the city of New York will be delivered by Robert L. Moran, acting mayor and president of the board of alderman. The address of welcome on behalf of the commission of highways of the state of New York will be by Edwin Duffy, commissioner. Response in behalf of the American Road Builders' Association will be by Arthur H. Blanchard, president. The following papers will be read:

"Operations of the Bureau of Public Roads Under the Federal Aid Act," by P. St. J. Wilson, acting director, United States Bureau of Public Roads.

"Building for the Future," by Andrew H. Phelps, secretary of the eastern district, Chamber of Commerce of the United States of America.

Tuesday, Feb. 25, 2.00 p. m.

"Efficiency of Bituminous Surfaces and Pavements Under Motor Truck Traffic," by Prevost Hubbard, chemical engineer, United States Bureau of Public Roads.

"Present Status of Brick Pavements Constructed with Sand Cushions, Cement Mortar Beds and Green Concrete Foundations," by Major W. M. Acheson, division engineer, New York state commission of highways.

"Recent Developments in the Construction, Maintenance and Reconstruction of Cement-Concrete Pavements," by A. D. Williams, chairman, state road commission of West Virginia.

Tuesday, Feb. 25th, 8.00 p. m.

Motion pictures by The Barrett Company, Granite Paving Block Manufacturers' Association of the United States, Koehring Machine Company, National Paving Brick Manufacturers' Association, Portland Cement Association and Warren Brothers Company.

Wednesday, Feb. 26, 9.30 a. m.

"Efficient Methods of Contracting for Highway Work During the Reconstruction Period," by John H. Gordon, president, New York Road Builders' Association.

"Street Systems, Their Relation to Highways Outside of Urban Districts," by Nelson P. Lewis, chief engineer, board of estimate and apportionment of New York City.

"Cost Keeping for Highway Contractors," by H. P. Gillette, editor-in-chief, "Engineering and Contracting."

"Foundations for Heavy Horse-Drawn and Motor Truck Traffic," by C. M. Pinckney, chief engineer of highways, borough of Manhattan, New York City.

Wednesday, Feb. 26, 2.00 p. m.

"Economic Utilization of Labor Saving Road Machinery," by Charles M. Upham, chief engineer, Delaware state highway department.

Report of committee on "Convict Labor on Highway Work: Organization, Administration, Camps and Cost Data," chairman, G. P. Coleman, state highway commissioner of Virginia.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

PAVING IMPROVEMENTS are to be made by the cities of Columbus, Wis., according to plans prepared by the consulting engineer, W. F. Reichardt.

WATERWORKS and SEWERAGE IMPROVEMENTS are to be made by the city of Bayard, Neb. Plans were prepared by the consulting engineering firm of Slezer & Finley.

Poinsett county, Harrisonburg, Ark., will receive bids in March for ROAD CONSTRUCTION. The plans were prepared by the consulting engineering firm, the Morgan Engineering Co.

Jersey City, N. J., has advertised for bids for the construction of a WATER MAIN under the Hackensack and Passaic rivers, according to plans prepared by the consulting engineer, Laurence A. Ball.

Hastings Drainage District, Hastings, Fla., has advertised for bids for the construction of a DRAINAGE SYSTEM, involving 526,062 cubic yards of open ditch and concrete and wooden bridges. The consulting engineers are Ellis, Curtis & Kooker.

Report of committee on "Sources of Supply of Unskilled Labor for Highway Work," chairman, Paul D. Sargent, chief engineer, Maine state highway commission.

Wednesday, Feb. 26, 7.00 p. m.

Annual A. R. B. A. stag-dinner, grand ballroom of the Waldorf-Astoria Hotel, Fifth avenue and Thirty-fourth street. Tickets, at \$4.00 a cover, may be obtained at the registration headquarters. (Note: It is requested that business suits be worn at the dinner.)

Gen. T. Coleman du Pont will preside. The dinner will be followed by an entertainment provided by the local entertainment committee.

Thursday, Feb. 27, 9.30 a. m.

Joint session of American Road Builders' Association, American Automobile Association, Highway Industries' Association and National Highway Traffic Association.

Report of committee on "Methods of Strengthening and Reconstructing Highway Bridges for Heavy Motor Truck Traffic," chairman, Willis Whited, bridge engineer, Pennsylvania state highway department.

Report of committee on "Reconstruction of Narrow Roadways of Trunk Highways with Adequate Foundations and Widths for Motor Truck Traffic," chairman, H. E. Breed, first deputy highway commissioner of New York.

Report of committee of the National Highway Traffic Association on "Regulations Covering Speed, Weight and Dimensions of Motor Trucks," chairman, (Continued on page 171)

Newmarket, Ont., plans to install a new WATERWORKS SYSTEM. The consulting engineers are the firm of James, Loudon & Hertzberg.

WATERWORKS IMPROVEMENTS are to be made by the city of Wewoka, Okla., according to plans prepared by the consulting engineering firm, the Benham Engineering Co.

The WATERWORKS situation in New Rochelle, N. Y., is to be investigated by Farley Gannett, member of the consulting engineering firm of Gannett, Seelye & Fleming.

Oxnard, Cal., is contemplating the installation of a municipal GAS PLANT, the estimated cost of which is \$140,000. The firm of Olmsted & Gillelen and Jos. M. Berkeley are the consulting engineers.

WATERWORKS IMPROVEMENTS, including the laying of 30-inch cast iron water pipe under and across the Hackensack river to connect with the pipe lines of the city of Bayonne, N. J., are to be made by that city. The plans were prepared by the consulting engineer, Morris R. Sherrerd.

INDUSTRIAL NEWS

The Iron and Steel Situation.

The industry seems to be approaching definitely the opinion that there must be substantial reductions in prices in the near future. While it has been realized that a well-distributed demand for steel products could not be expected at anything like war-time prices, it was thought that there would be a running demand of moderately fair proportions at high prices, particularly from those to whom time is an object.

There was a disposition to divide buyers into two classes, those who buy for immediate consumption, or for ordinary manufacturing operations, and those who buy for investment purposes, in other words, who put the steel into investment projects such as bridges, buildings, factories, power stations, and enterprises of that general class, where a large depreciation in value in the first year or two of the life of the operation would be a great handicap to successful competition with other enterprises of the same class, either older or newer.

It was thought that the ordinary everyday buyers would continue to buy, no matter what the price, while the investment buyer was not ready to buy, no matter how low steel prices might descend. Hence it seemed to be sound policy to maintain prices, or maintain them approximately, until the "investment buyer" was seen to be ready. This policy, however, is now seen to be working out quite unsatisfactorily. The everyday buyer is buying very sparingly, and the sum total of all buying is extremely light.

One difficulty the steel producers see, however, is that any particular reduction, whether of \$2 a ton or \$20 a ton, would not stimulate buying at the outset. There is no price cut that any one could recognize as the final cut, because nobody knows just where the cost level lies, not even the producer, let alone the consumer, and even then there is no guarantee that a cut down to cost would not be followed by a cut below cost.

There are definite rumors that some leading producers contemplate a reduction of about \$4 a ton in some leading products.

The most remarkable thing in the steel business is the heavy rate of production as contrasted with the demand. All producers have been describing the demand for weeks past as very light, yet the mills have been able to operate at a very fair rate. This means that stocks must be kept up.

While export demand does not measure up to the expectations entertained a few weeks ago, it has improved distinctly in the past week or two. There are many inquiries, although individual inquiries do not represent large tonnages. In this connection, it is interesting to note, that in the organization agreement of the Consolidated

Steel Corporation, recently organized by independent steel concerns to promote export trade, is an item requiring each of the constituent companies to hold 10 per cent of its output at the call of the export company.

In relation to any extensive price reduction, producers must, of course, consider the present high wage scale.

A few steel producers have been suggesting that further reductions in steel prices should not be expected without wage reductions being made at the same time. Whatever may be the theories and desires as to wages paid by the steel industry, there is absolutely no prospect that any serious effort will be made to reduce wages this side of July 1 at the earliest. Word seems to have been passed around that the subject might as well be held in abeyance for that length of time at least.

Cast-iron-pipe.—The pipe situation seems to be improving, as far as volume of business is concerned, municipal inquiries increasing noticeably. Prices remain as follows: Chicago—4-inch, \$64.80; 6-inch and larger, \$61.80; class A, \$1 extra. New York—4-inch, \$65.70; 6-inch and larger, \$62.70; class A, \$1 extra.

Wallace & Tiernan Co., Inc., 349 Broadway, New York City, manufacturers of "W. & T." chlorinating apparatus, has recently appointed David Morey, jr., southwestern representative. Mr. Morey is located at 507 Scollard Buldg, Dallas Tex.

The Brown Hoisting Machinery Co., Cleveland, O., has issued a comprehensive new catalog featuring "Brown-hoist" locomotive cranes. After enumerating the uses of this equipment and describing the construction of the various parts, the catalog presents about two hundred photographs of installations. These illustrate buckets (grab and dragline); coal and coke handling; construction work; 3 to 5 ton cranes; 30 to 40 ton cranes; dock, dragline, excavating, wharf work-crane and special cranes, including steam, electric and gasoline-driven, lumber handling, magnet work, ore handling, pile-driving, sand and stone handling, shipbuilding, etc. The installations include domestic and foreign. Among the most interesting are those showing cranes at work for contractors, public utility plants and on docks.

NEWS OF THE SOCIETIES

(Continued from page 170)

man, George H. Pride, president, Heavy Haulage Company.

Thursday, Feb. 27, 2.00 p. m.

Joint session of American Road Builders' Association, American Automobile Association, Highway Industries' Association, National Highways Association and National Highway Traffic Association.

Motion picture "Ocean to Ocean by Motor Truck," by H. S. Quine, secretary to the president, The Goodyear Tire and Rubber Company.

"Interrelationship of Highways, Railways and Waterways," by George H. Pride, formerly member Highway Transport Committee, Council of National Defense.

"National Highways," by Gen. T. Coleman du Pont, chairman, Board of National Councillors, National Highways Association.

Report of committee on "National Highways," chairman, Edward J. Mehren, editor, "Engineering News-Record."

Friday, Feb. 28, 9.30 a. m.

Report of committee on "Civil Service Requirements for Highway Engineering Positions," chairman, H. G. Shirley, secretary, Highway Industries' Association.

"Efficient Methods of Promoting Highway Bond Issues," by S. E. Bradt, state superintendent of highways of Illinois.

Report of committee on "Methods of Financing Highway Improvements for States, Counties and Towns," chairman, Nelson P. Lewis, chief engineer, board of estimate and apportionment of New York City.

Report of committee on "Economic Status of Guarantees for Pavements on Roads and Streets," chairman, Francis P. Smith, consulting paving engineer, New York City.

Friday, Feb. 28, 2.00 p. m.

"The Motor Vehicle in Warfare" (illustrated), by John R. Eustis, secretary, Motor Truck Board, American Automobile Association.

Report of committee on "Uniform Highway Signs," chairman, Robert A. Meeker, consulting engineer, Newark, New Jersey.

Report of committee on "Efficient Methods of Snow Removal from Highways Outside of Urban Districts," chairman, Charles J. Bennett, highway commissioner of Connecticut.

"Methods of Maintaining Highway Systems to Construction by the State of County," by Frederick E. Everett, commissioner of highways of New Hampshire.

Business session of the American Road Builders' Association.

Report of resolution committee.

Indiana Engineering Society.

The annual convention of the Indiana Engineering Society was held Jan. 23, 24 and 25 at Indianapolis.

"The Concrete Road and Its Mission" was the subject of the first paper which was read by C. D. Franks, of Indianapolis, engineer for the Portland Cement Association. M. T. Calef, highway engineer, of South Bend, delivered an illustrated lecture on "Better Cost Keeping for Highways"; A. W. Grosvenor, of Ft. Wayne, county surveyor of Allen county and president of the County Surveyors' Association, spoke on "Problems of the County Sur-

veyor," and "Highway Extension at Purdue University" was the subject of an address by R. C. Yoeman, associate professor of highway engineering at Purdue. The session closed with a general discussion of the county unit highway bill.

The economic welfare of the engineer was the general topic of discussion Thursday evening. The Indianapolis chapter of the American Association of Engineers participated in the meeting. W. H. Finley, of Chicago, president of the American Association of Engineers, who was to have delivered an address, was unable to appear because of illness.

A bill before the legislature for the licensing of architects and structural engineers in Indiana was outlined by H. O. Garman, chief engineer for the public service commission. This bill, Mr. Garman said, provides for an examining board of five members—two architects, two structural engineers and one member who shall not belong to either class. Separate examinations for architects and engineers are to be given, but the holder of either license may practice in both fields. An original license fee of \$50 is required with an annual renewal fee of \$10.

To prevent hardship, the bill contains a clause by which all architects and engineers now practicing in the state may obtain a license within six months after the enactment of the law without examination. The definition of architectural or structural engineering is the planning, designing or supervision of the erection, enlargement or alteration of buildings, or any part thereof, for others, and to be constructed by persons other than the engineer.

Provision is made for issuing licenses without examination to architects of other states which have similar laws and to members of any organization which has high requirement for membership. After paying the expenses of the commission, it is said, the law would result in a considerable income to the state, though the benefit to the public in the safeguarding of life, health and property would far exceed the revenue to the state value.

The part played by the engineer in the world war would have been even greater and more brilliant than it has been if the profession at the outbreak of hostilities had been organized as were physicians and surgeons, said Charles E. Drayer, of Chicago, secretary of the American Association of Engineers, in speaking on the co-ordination of various branches of the profession.

A plan for placing municipally owned public utilities in Indiana cities under the control of non-partisan boards and providing civil service rules for employees in such plants was presented to the society by John W. Mueller, of Richmond, chairman of the society's legislative committee, and a bill to carry out the plan will be drawn and presented to the legislature.

The public utility situation in In-

diana is clearing up rapidly, and improvement of service and abolition of war surcharges may be expected before long, said H. O. Garman, chief engineer of the Indiana public service commission, in an address delivered at the Friday afternoon session.

Central heating plants were sorely pressed during the war, gas concerns suffered greatly, street railway and interurban line investments are seriously impaired and water supply utilities have sustained some losses, Mr. Garman said. Telephone utilities have suffered least of all from war conditions, he asserted. "Central station heating plants were sorely pressed, both hot water and steam plants; many of them would have abandoned service entirely if the commission would have permitted it and if it could have been done without causing suffering to their patrons. None of the thirty-seven heating plants in Indiana made a fair return on their fair value, and by agreement three of them have abandoned service permanently, and there are several others that were offered as a gift, in public hearing before the commission, to any one, but without a taker. The central station heating business has suffered terribly from poor management and high prices, and the rates have reached the point where they are nearly prohibitive. Next to the heating plants, the gas plants were affected by a shortage of labor, zoning out of coal, poor gas coal substitutes, high prices and poor management. New gas standards are now being developed in collaboration with the United States Bureau of Standards. There is no doubt but that the B. t. u. standard must come down. Water supply utilities have suffered only the usual war increases in cost of purification materials, coal and labor, and when normal prices are restored they will be back nearly to a pre-war basis. New economic conditions are facing the street railways and interurban railways, and the safety of the investments are being seriously impaired. The end is not in sight. They are confronted with increasingly higher taxes, they are being paralleled with market highways and heavy construction carrying vehicles in competition to them, and they are suffering the high operating costs that all other public utilities have met with."

The society indorsed a proposed bill to create a non-partisan board of control for municipally owned public utilities and to provide for employment of all help in such utility plants by civil service rules. The bill will be drafted and supported by representatives of the engineering society. The purpose of the proposed legislation is to prevent financial loss to taxpayers through incompetent handling of municipally owned utilities. The bill will provide for the appointment by the mayor of a city of one director for any publicly owned utility after a petition, signed by 25 per cent of the city's voters, requesting such action, has

been presented. Following the appointment of this one director, the state public utilities commission would name a second director and the two would select a third. The directors would draw nominal salaries and would employ a manager who would be responsible for the operation of the plant. The directors would decide questions of finance and policy.

Other bills indorsed by the engineering society, on recommendation of the resolutions committee, were: A bill providing for the licensing of structural engineers and architects, the new state highway commission bill, a bill setting a new standard of qualifications and salaries for county engineers, the tax commission bill and the full suffrage for women bill. The society went on record as opposed to any measure that might restrict the authority and activity of the Indiana public service commission.

A banquet was held Friday evening. Frank J. Pollay, a special agent of the department of labor, declared that the United States, under pressure of war conditions, accomplished in two years a survey of its resources such as was made in Germany by the German government in fifty years. Other speakers were: Professor Frank C. Wagner, of Rose Polytechnic Institute; Samuel E. Greeley, of Chicago; D. D. Ewing, of Lafayette; F. F. Chandler, of Indianapolis, and A. W. Grosvenor, of Ft. Wayne.

The following papers were read at the Saturday morning session: "Psychological Methods for Selection of Soldiers, Officers and Employees," by Professor C. F. Harding, of Purdue university; "Efficiency Engineering in Industrial Plants," by J. E. Hannum, of Indianapolis; "The Year's Progress in Electrical Engineering in the Allied Fields," by Professor D. D. Ewing, of Purdue university; "Some Recent Technical Developments in Telephony," by Professor R. V. Achatz, of Purdue university; "Electrical Pumps in Municipal Water Works," by Prof. D. D. Ewing, of Purdue university; "The Decimal Versus the Dozen System of Writing Numbers," by John D. Riggs, of Indianapolis.

The following officers were elected for the year: G. A. Young, Purdue, president; Charles Cheney, Indianapolis, former county surveyor of Marion county, vice-president; R. P. Wiley, Purdue, trustee; F. C. Wagner, Rose Polytechnic, and E. S. Pearce, Indianapolis, trustees for two years. W. H. Insley, Indianapolis, and John T. Wilkin, Connersville, are holdover trustees.

Boston Society of Civil Engineers.

The following nominations for office have been proposed by the nominating committee of the Boston Society of Civil Engineers:

President, Leonard Metcalf; vice-president, Robert Spurr Weston; secretary, S. Everett Tinkham; treasurer, Frank O. Whitney. The election takes place March 10.

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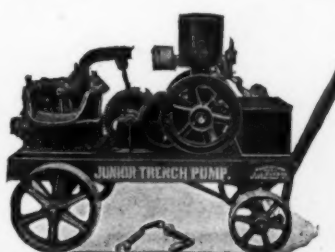
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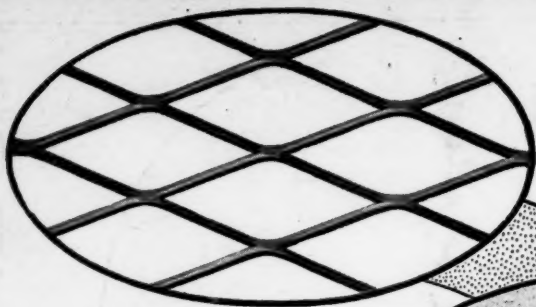


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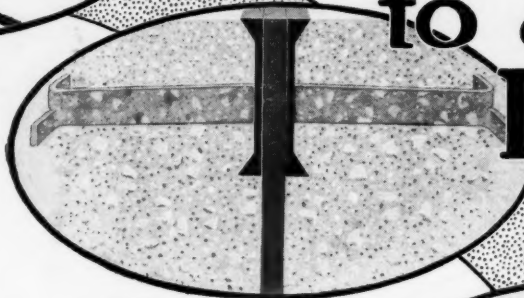
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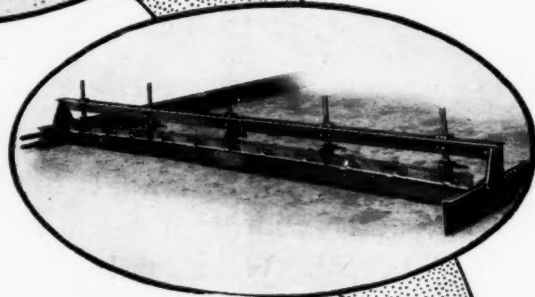
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